THE IRON TRADE REVIEW

VOLUME XXXII. CLEVELAND, O. OCTOBER 19, 1899. CHICAGO, ILL. NUMBER 42

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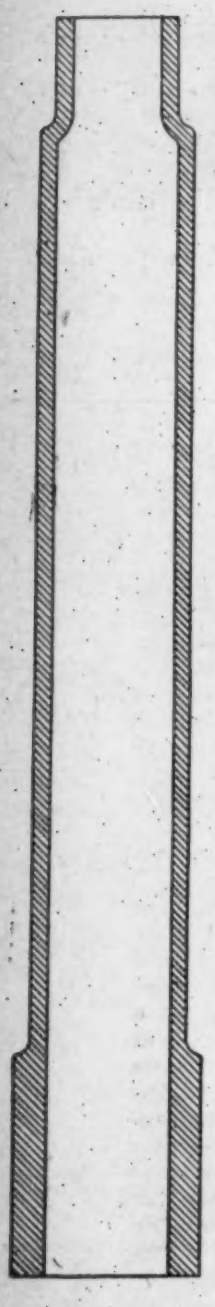

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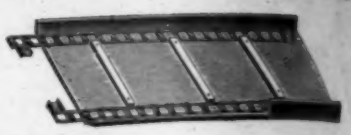

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THE IRON TRADE REVIEW

VOLUME XXXII. CLEVELAND, O. OCTOBER 19, 1899. CHICAGO, ILL. NUMBER 42

THE WEEK IN IRON CIRCLES.

So far as pig iron and the intermediate products of steel works are concerned, the situation presents all the aspects of strength that have been emphasized in the past few weeks. In finished lines, the readjustments that must follow the extreme congestion characterizing all the mills in recent months are apparent here and there. From paying premiums for early deliveries buyers are now receiving quotations for contracts beginning and ending in the coming year, and these in some lines are below the famine prices due to the special glutting of producing capacity. The usual market report terms do not convey truthful impressions. Along the whole line of finished products the position is one of great strength; yet it is not the sort of strength that was exhibited in the feverish and excited struggle for material that could not be had, and on which no promise could be made, as in July, August and September. The sentiment that has been abroad in the past month that prices are too high has had some effect. It has convinced some buyers that they do not want to contract for all their supply for the first half of 1900 on the present basis. In Bessemer steel products, for example, it is not to be expected that the relatively small amount of Bessemer pig iron and of Bessemer billets that is sold in the market will determine the basis of the large tonnage of mill output. The Bessemer pig iron that can be produced at merchant furnaces has been largely sold for the first half of 1900, so that the price is well established. The same is true, though not quite to the same extent, of billets and sheet bars, so that no lower contract price on steel is to be expected for the first half of 1900. But there is a large tonnage of the production of finished material for the first half of 1900 that is yet unsold. Consumption as it develops may hold prices substantially on the basis of today; yet the certainty is not the same, from the buyer's standpoint, that obtains in respect to pig iron and billets. The storm center of the industry, in the past week, has been in ore transportation. A rate of $1.25 on ore from the head of Lake Superior has been established for 1900 by a stroke of the Rockefeller vessel interests, which has been as agreeable a surprise to vesselmen as the announcement four years ago of Mr. Rockefeller's contracts for vessels to carry his own ore was a depressing one. Of the significance of this coup more is said elsewhere; its effect on the iron trade will be the establishment of an ore price 25 cents higher than has appeared likely heretofore. No sales of ore are reported as yet, but the month of November may bring some developments. The rate of consumption of iron as indicated by the pig iron statement for Oct. 1 is 14,500,00 tons per annum. But in spite of an addition of 11,0000 tons a week to production between Sept. 1 and Oct. 1 stocks were reduced, demonstrating that whatever business is being postponed by high prices, there is still going into consumption more than the current make of pig iron. The week's business in pig iron has included round lots by agricultural interests in the Chicago district, but in general sellers of foundry iron have had some let-up. Further sales of Bessemer iron have been made at $23 to $23.50, valley, and a considerable transaction is pending, the price on which is expected to be fixed by the associated valley furnaces at a meeting in session at this writing. In general, finishing mills are receiving specifications equal to current shipment, but contracting for 1900 is not so active.

PITTSBURG.

OFFICE OF *The Iron Trade Review and Industrial World*, 705 PUBLICATION BUILDING, Oct. 18.

The future course of the iron and steel market is more in doubt now than at any time for a considerable period. In the face of general indications that there will be a greater scarcity of Bessemer pig iron in the first half of next year than there is now, the metal has not advanced, except for quick shipment. In a number of finished lines there are indications of weakening, which may be the precursor of lower prices, or may fill up mills which do not take so optimistic a view of the situation as do others, and thus pave the way for considerably higher prices later on. There have been some heavy transactions in Bessemer billets for next year, but the mere fact of the sales, and the price, are both carefully guarded. The fixing of the minimum rate for ore carriage for next year at $1.25 from upper lake ports is regarded as a shrewd move on the part of the chief ore-carrying interest, but there are conditions which tend to offset its importance. It will, however, strengthen the position of the ore men, and the price of next season's ore is quite likely to be higher than has been expected. On the other hand the price of coke, which will be fixed within a few days, will not exceed $3, and may be as low as $2.75, which is to be considered a very moderate figure under the conditions. In any case the year 1900 wil be a good one for the merchant blast furnaces, but their prospects in the following years are not so good.

The plans which are being made and carried out for an increase in production of raw and finished material will give the country a producing capacity beyond the possibilities of consumption at home and in the next few years nothing but an enormous increase in our exports of iron and steel can keep all occupied. No such trade can be built up on the present basis of prices for raw and finished material. It is one thing to dump a small surplus of production on foreign markets, when the price is unimportant on account of the comparatively small tonnage, and a totally different thing to sell a large percentage of the production abroad. In the latter case a fair profit on every ton is necessary.

PIG IRON.—The week has been rather a quiet one. The leading Central Western billet interest has purchased 50.000 tons of Bessemer iron, 45,000 tons of the Repubic Iron & Steel Co., on a conversion deal. An offer for a much larger tonnage has been made to the furnaces, and rejected, and a meeting is being held in Cleveland today (Wednesday) to fix a price. It is not likely to be much under $23.50, and if the figure meets with approval it is probable a tonnage will be taken which will leave the association furnaces with practically nothing further to sell for the first half. The Chicago interest has purchased 18,000 tons of Bessemer and there have been odd sales enough to bring the total of Bessemer iron for the week to a trifle over 75,000 tons. Two or three small lots were sold for this year's delivery, and as high as $25, Pittsburg, has been paid in one case. The sales for the first half of next year have ranged from $23 to $23.50, Valley, and for

this year up to $24.25 or $24.50, Valley. In foundry iron there has been very little done. The tie-up of the bulk of the Pittsburg foundries continues. Several foundries have started again, but it is understood that to start them required no real concession of importance to the men. In gray forge the market is a trifle quieter, and prices in the Valley are about 25 cents lower. We quote the market as follows, it being understood that for Bessemer and foundry iron premiums are paid for shipments within the next sixty days:

Bessemer, valley furnace	$23.00 to 23.5
Bessemer, Pittsburg	23.75 to 24.7
No. 1 Foundry	23.50 to 24.0
No. 2 Foundry	22.75 to 23.2
No. 3 Foundry	22.00 to 22.5
Gray Forge, valley furnace	21.00 to 21.2
Gray Forge, Pittsburg	21.00 to 21.5

STEEL.—There has been considerable quiet selling of billets and slabs for delivery in the first half of next year, but the greatest secrecy is maintained about the transactions and it is generally understood that the prices secured have been as good as conditions would seem to warrant. Billets can be had for next year at $37 to $38 at the outside. For prompt shipment, while the mills are still decidedly behind, deliveries extending over two months can be had at $40. In sheet bars there has been considerable selling into next year, and the price has ranged from $37 to $38. Indications are that the proper relative position of billets and sheet bars, which has for some months been considerably disturbed, will be restored in the near future. Sheet bars should sell at about $2 a ton above billets, and in the past have sold at a higher differential than this.

FERRO-MANGANESE.—Ferro-manganese continues scarce and in good demand. The minimum price is $100 for 80 per cent, while small lots for quick shipment have sold as high as $125.

RAILS AND TRACK MATERIAL.—The nail mills are busily engaged in forming a policy for next year's business and it is probable a heavy tonnage will have been disposed of before long. There is no fixed price and a quotation is made on each enquiry. The last announced price was $33 at mill. In track material the demand continues good, and we quote prices unchanged as follows: Spikes, 2.60c to 2.75c; track bolts, square heads, 3.10c; hexagon heads, 3.25c; splice bars, 2.40c to 2.60c; links and pins, 2.70c to 2.75c.

BARS.—There is considerable excitement in the market for steel bars. There has been a contest for tonnage between two leading interests which each possess a number of mills and lower prices have been quoted for next year's delivery. It is understood that a third interest, which does very little in this line except in connection with structural material, has been meeting the lower price named. The balance of the mills are holding aloof and profess to be perfectly satisfied to see these mills getting filled up. For this year 2.50c is the general quotation on steel bars, except that for some sizes one or two manufacturers are quoting 2.40c. For next year quotations as low as 2.35c has been done on bars sold in connection with structural contracts. In iron bars prices are about the same as steel bars.

STRUCTURAL MATERIAL.—There is a continued good demand for structural material, especially for industrial plants. Regular orders cannot be taken except for delivery in the course of two or three months, and some mills are probably still further filled up. For odd lots for quick shipment higher figures are paid than the regular quotations, which are as follows: Beams and channels, 3 to 15 inches, 2.25c; 18 to 24 inches, 2.35c; tees, 2.30c; zees, 2.25c; angles, 2.25c. Universal mill plates are quoted at 2.75c to 2.90c.

PLATES.—The plate market has settled down to a more rational basis and for delivery in the first quarter or first half of next year prices are lower. For the balance of this year the mills are so well filled that former prices are well maintained. For delivery after Jan. 1 we now quote: Tank, 2.70c to 2.80c; shell, 2.80c to 2.90c; flange, 2.90c to 3c; fire box, 3½c to 4c, and for large and desirable orders these figures might possibly be shaded.

PIPES AND TUBES.—The demand this week has been a trifle heavier than last and the market is in a very strong condition. The mills have deliveries pretty well in hand, and can ship in from 30 to 60 days. We quote discounts unchanged as follows: Merchant pipe, 50 and two 10's for carloads and 50, 10 and 5 for less than carloads, carloads being delivered within the specified territory and less than carloads being f. o. b. mill; well casing, screw and socket joint, 40; inserted joint, 35, with an optional 5 per cent to dealers only; boiler tubes 1¼-inch to 1½-inch, 40 per cent off; 1¾-inch to 2½-inch, 50 per cent off for iron, and 55 per cent off for steel; 2¾-inch and larger, 52½ per cent off for iron and 55 per cent off for steel, with 5 per cent additional in carloads, less than carloads being f. o. b., mill.

SHEETS.—The sheet market is again weaker, and there would be no difficulty in doing 3.20c for No. 28 common. The position of the proposed combination of sheet mills is shrouded in mystery. There are reports that the project has been dropped but there is no proof that this is the case, and the promoters may have good reasons for not showing their hands until just before the options expire, which will be in two weeks. In galvanized iron the market is weak at 70 and 10 per cent, generally quoted.

SPELTER.—The shut-down of mines in the zinc region has continued since Oct. 1, and the end desired has not yet been attained, but the miners are firm. No effect has yet been felt in spelter, which may be had at 5.40c, Pittsburg, for prime Western grades.

OLD MATERIAL.—Prices are in general somewhat firmer, but not quotably higher, and we repeat last week's figures, Pittsburg, gross tons, except where otherwise specified: Steel rails, mixed lengths, $19 to $20; short lengths, $20 to $21; iron rails, $26 to $27; cast borings, $11.50, net tons; cast scrap, $17.50; No. 1 wrought scrap, $19 to $20, net tons; busheling scrap, $15 to $16, net tons.

COKE.—The car shortage continues, and furnaces are having considerable difficulty to keep running, but so far none in the Pittsburg district or the valleys are banked. It is understood that there has been some selling for next year, but no general movement is yet in order. The price at which business will be taken may be announced in the course of a week. There is no likelihood that it will be below $2 75 or above $3. There is nothing doing for immediate shipment as cars are not sufficient to carry coke already contracted for. Considerable coke has been piled up at the ovens, which are now running at a reduced rate.

CHICAGO.

Office of The Iron Trade Review and Industrial World.
1522 MONADNOCK BLOCK, Oct. 18.

There is a great deal of discussion regarding the future on the part of both buyers and sellers, and arguments are heard in favor of both lower and higher prices for next year, but in the meanwhile consumers are taking about all the material the mills and furnaces can sell them, and at the producers' prices. The week just closed showed a large tonnage of orders for nearly every class of iron and steel, and the demand gives no sign of slackening.

PIG IRON.—Business was of large dimensions and included several orders of considerable size. Two important buyers closed contracts for large lots, these being in addition to orders placed earlier in the year, which it was supposed would last them for the season. Foundries continue very busy, and cases of shutdowns because of shortage of material are more frequent. This is especially true of malleable foundries. Iron for immediate delivery is almost impossible to secure, and the furnaces are nearly all sold ahead for the first six months of next year on most grades. In spite of the large and numerous orders placed last week, there are a number of buyers in the market, and the demand appears to be increasing every week. Our quotations on Southern irons for the past two or three weeks have been too high, as an error was made by the local representatives of the Southern furnaces in advancing prices some time ago. Quotations are revised as follows:

Lake Sup. Charcoal	$24 00 @ $26 00	Southern Coke No. 3	$20 65 @ $21 65
Local Coke Fdy. No. 1	23 50 @ 24 00	Southern No. 1 Soft	22 65 @ 23 65
Local Coke Fdy. No. 2	23 00 @ 23 50	Southern No. 2 Soft	21 65 @ 22 65
Local Coke Fdy. No. 3	22 50 @ 23 00	Southern Silveries	26 50 @ 27 05
Local Scotch Fdy. No. 1	23 50 @ 24 00	Jackson Co. Silveries	24 00 @ 25 00
Local Scotch Fdy. No. 2	23 00 @ 23 50	Ohio Strong Softeners	31 00 @ 32 00
Local Scotch Fdy. No. 3	22 50 @ 23 00	Alabama Car Wheel	25 00 @ 26 00
Southern Coke No. 1	22 65 @ 23 65	Malleable Bessemer	23 50 @ 25 00
Southern Coke No. 2	21 65 @ 22 65	Coke Bessemer	24 00 @ 25 00

BARS.—Considerable business was done in the week, and the demand is very large. The mills are all busy shipping on old contracts, and are not pushing for business, they say. It is reported that some effort has been made by one or two mills to secure business, and that prices have been made a little lower than we quote on desirable orders, but the mills

interested deny this, saying that they are securing full quotations, and more, on all business placed. The particular sale which started the talk was one of steel bars, Milwaukee delivery, which was said to have been made at 2.25c, delivered. Common iron is quoted at 2.30c to 2.40c, and soft steel bars at 2.30c to 2.50c, half extras, Chicago delivery.

CAR MATERIAL.—Three or four small orders for cars were placed last week, and it is reported that several large contracts are being figured on at the present time. Railroads are very short of cars, and are pushing the car works for deliveries on old contracts.

STRUCTURAL MATERIAL.—There was only a small lot business last week, the demand being confined to immediate necessities. There are no large contracts in sight for the immediate future. Prices are as follows: Beams, 15 inches and under, 2.40c; 18 inches and over, 2.50c; angles under three inches and over six inches, 2.50c; three inches to six inches, 2.40c; sheared plates, 3.15c to 3.25c; universal plates, 3.15c to 3.25c; tees, 2.45c; zees, 2.40c; small lots from store are quoted from ¼c to ½c higher.

PLATES.—Numerous large inquiries for plates for mill shipment have come up in the past week, but the local mills have been obliged to refuse to quote on them, as they are sold so far ahead. No mill business was done in the week, but store business was of large dimensions. Prices are made as follows: Tank steel from store, 3.40c to 3.50c. Mill shipments, Chicago delivery: Tank steel, 3.25c; shell, 3.35c; flange, 3.40c; marine, 3.40c; fire box, 4c to 6c, according to brand.

MERCHANT PIPE.—Inquiries are numerous and large, but mills are not taking much of the business offered. Store business was good in the week. Prices are unchanged at 50 and 10 and 10 per cent off.

SHEETS.—There is a good demand for both black and galvanized sheets and several quite large sales were made of both varieties. No. 27 black sheets are unchanged at 3.30c to 3.40c, and galvanized at 70 and 10 to 70 and 5 per cent off.

MERCHANT STEEL.—Several large season's contracts were placed last week, making the week's tonnage considerable. Sales in the past few weeks have been largely in excess of anything the local stores have done before. The demand is still large, and good contracts will be placed in the immediate future. Smooth finish tire steel is quoted 2.80c to 3c; smooth finish machinery steel, 2.95c to 3.05c; spring steel, 3.65c to 3.75c; tool steel, 7c to 7.50c; special, 13.50c and upwards.

BILLETS AND RODS.—In the absence of transactions there is no local market.

RAILS AND TRACK SUPPLIES.—The local mills took large orders for rails last week, and further business was taken in this territory by outside mills. There are a number of large orders still to be placed. Quotations are as follows: Rails, standard sections $33 to $35; light sections, $34 to $40; splice bars, 2.50c to 2.70c; spikes, 2.65c to 2.75c; track bolts, 3.65c to 3.85c.

OLD MATERIAL.—The market continues to go upward, and it is said that an effort will shortly be made by some of the larger buyers to force the price of old material down to what they consider a reasonable level. The movement has been started by an offer of $28 for old iron rails which dealers hold for $35 or better. Whether the movement will result in anything is a question. Stocks are very low, and dealers have been able to secure about what they wanted from buyers so far. Selling quotations are revised as follows:

Old iron rails, gross,	$35 00@$36 00	Axles, net	$31 00@$32 00
Old steel rails, long, gr.	24 00@ 25 00	Cast borings, net	10 50@11 50
Old steel rails, mixed	20 00@ 21 00	Wrought turnings, net	13 00@13 50
Old wheels, gross	21 00@ 22 00	Axle turnings, net	13 50@15 00
Railroad forge, net	25 00@ 26 00	Mixed steel, gross	16 00@17 00
Dealer's forge, net	19 00@ 21 00	Stove plates, net	11 50@12 00
No. 1 mill, net	16 00@ 17 00	Heavy melting steel, gr	19 00@20 00
Heavy cast, net	16 00@ 17 00	Old iron splice b., net.	27 00@28 00
Malleable cast, net	14 00@ 16 00		

WIRE AND WIRE NAILS.—The demand continues very large, and sales of considerable tonnage were made last week by the leading interest. The market is firm and unchanged. Makers quote single carloads of wire nails at $3.10 f. o. b. Chicago, and $3.20 less than car loads. On wire current quotations are as follows: Plain annealed wire, $2.95; painted barb wire, $3.55; galvanized barb wire, $3.70.

CLEVELAND.

OFFICE OF *The Iron Trade Review and Industrial World.*
27 VINCENT ST., Oct. 18.

The announcement was made in this column last week that the Bessemer Steamship Co. (Rockefeller) and not the Carnegie Oliver iron mining interest had secured the whaleback fleet by buying a majority of the stock of the American Steel Barge Co. In the same connection reference was made to the pending deals for vessel tonnage for 1900 and to negotiations for additional vessels by mining companies. Ore and vessel circles did not have long to wait for open developments. Limited circulation had been given to apparently reliable reports that tonnage was under option at $1 for the season of 1900. The Rockefeller interest straightway set on foot a plan of operations the significance of which has been becoming more fully apparent with each day of the past week. Having secured the 10 steamers and 20 tows of the whaleback fleet, it began chartering some of the largest vessels on the lakes at $1.25 for next season. Prominent among vessels so taken was the Mitchell fleet of eight vessels, capable of carrying between 800,000 and 900,000 tons in the season from the head of the lake. The largest four of these vessels were at the time under negotiation for sale to the Oliver Mining Co. on a reported basis of $350,000 each. The Rockefeller fleet, with the three vessels now building, is capable of bringing down 2,600,000 tons of ore in a season. The whaleback fleet added to this 1,600,000 tons. The chartering of the Mitchell fleet brought the total up to a round 5,000,000 tons. When it was considered that the Rockefeller fleet is under contract to carry only about 1,700 000 tons of ore outside of that produced by the Lake Superior Consolidated Iron Mines, it became apparent that the charters following the purchase of the whaleback fleet were calculated to fix a $1.25 rate on season contracts for 1900, a compensation perhaps for the 60 cent rate which was fixed for the Rockefeller and other boats early this year through the initiative of the Oliver Iron Mining Co. The more apparent has the purpose of last week's campaign become, as charters have followed charters in the last few days, the Bessemer Steamship Co. being credited now with an ore tonnage upwards of 5,500,000 available for next year. Rechartering of a portion of this is already discussed as a possibility, in view of the fact that the ore of the Lake Consolidated Iron Mines added to the Oliver Iron Mining Co. and Biwabik (part) ores which the Rockefeller fleet carries under contract, must fall considerably short of this 5½ million tons of total capacity.

The establishment of the $1.25 rate, which is just 25 cents higher than it would have been but for this stroke of Mr. Rockefeller's representatives, was not the only feature of the week's activities. In connection with recent negotiations for the purchase of vessels already built, the Oliver Mining Co. has been figuring on new vessels; and its order was placed in the latter part of the week with the American Shipbuilding Co. for five new steel ore carriers, two to be delivered at the opening of navigation in 1900 and the others early in the season. It was necessary, in order to secure these deliveries, for the Carnegie Steel Co. to engage to supply plates and shapes from its own mills, to keep pace with shipyard operations.

In addition the Oliver Iron Mining Co has bought the Clarence A. Black, a 6,000-gross ton freighter, and is negotiating for other vessels. It has also been taking tonnage from the head of the lakes, from Marquette and from Escanaba for next year, and is believed to be now covered by purchases, contracts and options, for the 5,000,000 tons it is expected to ship next year. Other shippers have not been idle, moreover, and at $1.25 from the head of the lake, $1 15 and $1.10 from Marquette and $1 from Escanaba considerable business has been done. There are reported to be some contracts from the head of the lakes, at less than $1.25, due to the revision of some of the earlier tentative agreements that were based on $1 to Ohio ports. It is estimated that the charters of the past week, added to the 9½ million of ore tonnage owned by or connected with ore interests have provided for between 15,000,000 and 16,000,000 tons of next year's shipments from Lake Superior. And still there is a large number of vessels of moderate and small capacity, and some few of modern capacity, the owners of which are disposed to hold off for the present, in expectation of better rates later, either on short season or wild charters.

The week has been entirely without precedent in the magnitude of the business done and in the forwardness of the movement. Naturally, the discussion of ore prices is on, and

the price schedule heretofore talked of, based on a $1 vessel rate, will now undergo revision. Inquiries from furnacemen are still coming in, but no ore meeting is probable for a few weeks at least. Estimates from the mines as to probable production in the 12-month following the close of navigation will be awaited before the question of next year's business is taken up seriously. The events of the week have made $4.75 as a base more likely than $4.50 for old range Bessemer ores.

PIG IRON.—Some activity in Bessemer iron is reported for the week. The Western steel interest has contracted for a half year's output, 1900, of an Ohio furnace, for delivery at its Lake Erie plant. Some sales have been made in the valleys on a basis of $23 and $23.50, and it is understood negotiations are pending for a considerable block of iron, to come from the associated valley furnaces. A meeting in Cleveland today is expected to fix a price that will lead to business, and if the deal is made the valley furnaces' output for the first half of next year will be nearly taken up. Sellers of foundry iron have not done a large business in the week, but there is a steady run of sales. Prices for No. 2 range from $22 to $23 at valley furnace, and on carload lots for quick shipment higher prices have been paid. We quote Cleveland prices:

Bessemer	$24 00	Valley Scotch No. 1	$23 00@23 50
No. 1 Strong Foundry	23 00@ 23 50	Valley Scotch No. 2	22 25@22 75
No. 2 Strong Foundry	22 50@ 22 75	Gray Forge, valley	21 00@21 50
No. 3 Foundry	21 50@ 22 00	Lake Superior Charcoal	25 00@26 00

FINISHED MATERIAL.—The trade of jobbers and that of mills able to make deliveries this year continue active and on all business for 1899 prices are maintained at the top figures heretofore quoted. For deliveries in 1900 the basis is somewhat below this, and the varying condition of mills and the size of the tonnage offered determine the price. There is steady buying of structural material and bars at the prices heretofore quoted. Some sales of open-hearth bars in connection with structural material have been made at 2.25c for delivery next year. We still quote iron bars at 2.15c valley mill, with the extra charges for cutting and for assorted sizes. Out of store, Cleveland, 2.50c is still the basis. Some of the large buyers of bars, who have covered only a portion of their supply for the first part of 1900 are waiting to see how the market shapes itself. One Central Western producer, with whom bars are not the leading product, has been seeking specifications recently, indicating that the mills are working out of the thick of the summer congestion. On plates there is some variation in prices, but for delivery this year nothing appears to be done below 3c for tank. Some sales of shell for delivery early next year have been made at 3c and of flange at 3.10c. There is figuring on ship plates for delivery early next year, the mills asking 2.90 to 3c. Prices of sheets are a trifle easier, Pittsburg mill quotations ranging from 3.05c to 3 15c for No. 27 common. The mills seem able to promise earlier deliveries on galvanized than has been possible in recent weeks. We quote 70 and 10 per cent. Pipes and tubes from mills are firmer; from stock we quote 50 and 10 to 50 per cent in small lots f. o. b. Cleveland.

OLD MATERIAL.—Prices continue high and in view of the scarcity of forge iron mills are active buyers. We quote old iron rails at $27 to $29, valley; old steel rails, $21 to $22; No. 1 railroad wrought scrap, $20; old iron axles, $27 to $28; machinery cast scrap, $16.50 to $17; old car wheels, $19 to $20; wrought turnings, $12.50 to $13; cast borings, $11.50.

WIRE AND WIRE NAILS.—The leading producer of wire and nails continues to ship its product as fast as made. There has been no advance, though cut nails in Eastern territory were recently put up 15 cents a keg. We quote Pittsburg prices on carload lots to jobbers, dealers' prices being 10c to 15c higher. Freight is to be added to outside points. Wire nails, $2.80; smooth wire, $2.65; painted barb wire, $3.25; galvanized, $3.40.

CINCINNATI

Oct. 17.

The week in pig iron selling circles has been quieter than those immediately preceding and prices go unchanged. Matthew Addy & Co. say: "There is no change in the situation, and no change is possible unless the buyers take it into their heads again to crowd the market and so force prices up to a higher level. As it is there is a steady purchasing of small lots but no change in quotations. There is the same complaint of the impossibility of getting enough cars in the South to meet current shipping orders even when there is the iron to satisfy them. And the complaint of consumers who are not getting iron fast enough are making the lot of the sales agent anything but happy. As far as the South is concerned the furnaces are so well sold up now that there is no likelihood of any weakening. In fact it would be a good thing for the Southern furnaces if they could retire from the market for a few months and so gain time to get their order books in better shape."

Rogers, Brown & Co. say of the week's business: "Most transactions have been for moderate amounts and early delivery, although there have been a few exceptions in the way of large orders for shipment after Jan. 1. Business would be considered large were it not for the enormous tonnage that has been booked during the past few months, and the demand has been of a general character. If an exception is to be noted, it is on high silicon brands, and this is probably caused by the larger output of soft and foundry grades by furnaces that have been making an undue proportion of mill irons heretofore. From the South the familiar report comes that several of the small stacks that were expected to go into blast have been delayed because of the impossibility of getting boilers and other necessary parts, and also for lack of fuel. The car famine is felt more keenly in the coke producing sections than at the iron centers, and unless the railroad companies arrange for additional equipment, a number of furnaces may be obliged to bank temporarily." We quote f. o. b. Cincinnati as follows: Southern coke, No. 1 foundry, $21.75 to $22.75; No. 2 foundry, $20.75 to $21.75; No. 3 foundry, $19.75 to $20.75; No. 4 and gray forge, $19.25 to $20.25; No. 1 soft, $21.75 to $22.75; No. 2 soft, $20.75 to $21.75; Lake Superior coke, No. 1, $24 to $24.50; No. 2, $23 to $23.50; Hanging Rock charcoal, No. 1, $25 to $26; Jackson Co. silvery, No. 1, $30 to $31; standard Georgia car wheel $22.25 to $23.25; Lake Superior charcoal, $25 to $26.

PHILADELPHIA.

Oct. 17.

The demand keeps up well; for early shipment it continues to exceed the supply, and prices are therefore uniformly firm, and in some instances a shade higher. The situation in pig iron is to be plainly read. Every month adds to the rate of production and yet cuts down the small available stocks, making clear that consumption is increasing. In finished material there is no question that some lines show less congestion of the mills, and that from being unable to make promises of deliveries, some definite assurance can now be given the average buyer who wants deliveries in the next two or three months. For prompt deliveries a price must still be paid. There are heard the predictions of those who believe that the top notch has been reached and that it is only a matter of a little time when the reaction will appear in lower quotations; but this is entirely a sentimental factor in the situation. The actual business being done does not bear it out. The buying of pig iron for 1900 continues at a steady pace. Any increase would be likely to cause a further advance in prices, but sellers are not encouraging this. They are as fully sold for next year, in most cases, as they care to be, some of them more fully than they could wish. We quote No. 1 foundry, standard brands, at $23.50 to $24; No. 2X foundry, $22.50 to $23; No. 2 plain, $21.50 to $22; gray forge, $19.50 to $20. The market for muck bar and steel billets is quiet. Sales of the latter have been made at $42 for early delivery, and $39 to $40 has been quoted for the first quarter of 1900. We quote muck bar at $32.50 to $33. In finished material prices are firm throughout the list, and there is no prospect of a change in the conditions at the mills, which have required such full operation in the past six months. We quote best refined bar iron at 2.20c to 2 25c; tank plates, 3.05c to 3.10c; angles, 2.38c to 2.50c; beams and channels, 2.43c to 2.60c; sheets No. 27, 3.50c; No. 28, 3.70c. It is hard to quote old material. As high as $30 has been paid for old iron rails and the same price for iron axles, but as a rule consumers do not expect to pay over $25 for iron rails and $27 to $28 for axles. We quote choice railroad scrap at $24 to $25; No. 1 yard scrap at $15.50 to $16.50; No. 2 light scrap at $12 to $12.50; machinery cast at $16.75 to $17.25; heavy steel scrap at $18.50 to $19; old steel rails at $21.50 to $22.50; wrought turnings at $13.75 to $14; cast borings at $12.75 to $13; old car wheels at $21.50 to $22.50; steel axles at $25 to $26.

INDUSTRIAL NOTES.

The Architectural Iron & Wire Works started at Wheeling, W. Va., about 18 months ago. The aggressive policy of the management and character of the product brought the company rapidly to the fore. The original proprietor, J. Moskowitz, had learned the business in Buda-Pesth and Vienna, and for years worked in architectural iron lines in New York, Brooklyn, Cleveland and Pittsburg. New capital has been interested and the incorporated company, chartered in West Virginia, has the following officers: E. A. Reich, New Martinsville, W. Va., president; Dr. Leo Reich, Cleveland, vice-president; H. S. Reich, New Martinsville, W. Va., secretary and treasurer. Mr. Moskowitz remains as superintendent of works. A new building at Chapline and 18th sts., Wheeling, has just been occupied and it is the intention to add iron and brass bedsteads to the line of manufacture. The company manufactures iron and wire fencing, elevator enclosures, grilles, iron shutters and doors, and general interior construction work in iron.

The foundry and machine shops at New Castle, Pa., formerly operated by James P. Witherow, but more recently by the New Castle Engineering Works, have been sold by the bondholders to New Castle parties, among whom are James W. Reis, Wm. Patterson, and John Stevenson, Jr. The price paid was $107,000, subject to confirmation by the court.

The Ohio Machine Tool Co., Kenton, O., has nearly doubled its capacity in the past 18 months. The demand continues fully up to capacity, and is equally good from both foreign and domestic sources. Several large shipments have recently been made. Another addition to the present plant is in contemplation. The present force is being operated 12½ hours a day.

The Crozer furnaces, Roanoke, Va., recently acquired by the Virgina Iron, Coal & Coke Co., are being repaired and enlarged. Improvements include machine shop for repair work (already completed) and two additional blowing engines, giving an engine capacity of six for the two furnaces; two new 400 h. p. boilers will be installed, and a new draft-stack 150 feet high has been erected. The output will be 350 tons a day.

The National Tube Co. has under contract a new blast furnace at Benwood, W. Va., and plans have been prepared for a second stack but no time has been fixed for its erection. The furnace under contract will form a part of the Riverside Department. The company has now one completed furnace at Benwood, which was formerly operated by the Riverside Iron Works.

On Tuesday night, Oct. 10, the 12-hour turn at the Edgar Thomson steel works of the Carnegie Steel Co., Ltd., made 103 heats of 15 tons in the converting department, and rolled 102 heats on the bloom mill. The following night new records were established of 117 heats in the converting department and 115 heats in the bloom and rail mills.

The charter of the Standard Seamless Tube Co., Pittsburg, was issued last week. The capital stock is $500,000. C. E. Pope is president of the new company and John H. Nicholson, secretary-treasurer. It will be remembered the company is erecting a seamless tube plant at Ellwood City, Pa.

The Pierce-Crouch Engine Co., New Brighton, Pa., is adding some improved machinery to its gas and gasoline engine plant, and in the near future expects to have the capacity doubled. For the month of September the company made the following sales in the Pittsburg district: R. E. Stone, McKeesport, Pa., two 35 h. p. engines; Geo. E. Lorch & Bro., Pittsburg, one 35 and one 25 h. p. engine; James J. Weldon, Pittsburg, one 35 h. p. engine; H. L. Braun, Pittsburg, one 35 h. p engine, all these being for electric lighting purposes. For miscellaneous purposes the following engines were sold American Art Glass & Lamp Co., Byesville O., one 50 h. p.; D. L. Clark & Co., McKeesport, one 13 h. p.; United States Glass Co., Pittsburg, one 20 h. p. So far in October the following engine sales were made: Pittsburg Valve & Machine Co., Allegheny, one 50 h. p.; Macbeth-Evans Glass Co., Pittsburg, one 25 h. p.; Dawes Mfg. Co., Pittsburg, one 25 h. p.; Record Milling Co., Punxsutawney, one 50 h. p.; Standard Horse Nail Co., New Brighton, one 40 h. p., and one 50 h. p., these last two making eight altogether to the same concern.

Improvements are being made in the plant of the Pennsylvania Tube Works at Pittsburg. Electric motors are being introduced for driving equipment. F. J. Hearne, general manager of the National Tube Co., is quoted as follows, in answer to questions: "We are doing considerable in detail in the way of applying electric motors and dispensing with a number of steam engines, but there is nothing revolutionary being attempted. We have thoroughly investigated the subject of electric welding and we have concluded that it has hardly reached the practicable stage. The field has wide possibilities, and it is hard to predict the extent to which electricity may yet be used in iron and steel manufacture. A more marked improvement is seen in the adoption of gas as a motive power. At the Oil City plant of the National Tube Co. steam engines have been entirely superseded by gas engines. Of course the main reason is the abundant supply of natural gas, but aside from this the use of gas engines is rapidly extending."

Contracts for $5,000,000 Worth of Lake Vessels.

With contracts for seven steamers closed during the past few days, the American Ship Building Co. now has on its books, for delivery running into July and August of next year, orders for 21 vessels, the value of which at present prices is about $5,280,000. This does not include a steamer building at Detroit that will be finished about the close of navigation. Of the 21 vessels to come out next year, all but one are freight carriers, and only four are tow barges. All the others are steamers. Three of them are of the Welland canal size kind, capable of carrying about 3,000 tons. The others are of the 6,000 and 8,000-ton class. These freighters will move in a single trip about 130,200 gross tons and in a full season a little more than 3,000,000 gross tons. The five Carnegie steamers just ordered will each be 475 feet over all, 50 feet beam, 29 feet depth and of about 7,200 gross tons capacity. They will have quadruple expansion engines (cylinders of 20½, 38½, 45 and 63 inches diameter, with 40 inches stroke) and three Scotch boilers each, the diameter of which will be 13½ feet and the length 12 feet, furnishing steam at 200 pounds pressure. It is understood that the two Welland canal size steamers, which have just been ordered by Mr. A. B. Wolvin, of Duluth, are very probably for a company of Cleveland and Buffalo vessel owners who are planning for elevators and other terminal facilities at Montreal, in order to develop a large business through the enlarged St. Lawrence canals. These vessels will be duplicates of the steamer Huron—252 feet over all, 238 feet keel, 42 feet beam and 26 feet hold, with triple engines of 18½, 31½ and 51 inches by 36 inches stroke. —[Marine Review, Oct. 13.

Active Car and Locomotive Building.

During September orders for 10,369 cars of all kinds were noted in the news columns of the *Railroad Gazette*. Of these cars 4,830 were box, stock, furniture and refrigerator cars; 2,575 were coal and gondola cars; 2,100 were steel cars; 700 were flat cars; 50 were tank cars and 114 were for passenger and street railroad service. Of the 10,369 cars noted, about 1,200 are to be built by railroads in their own shops. Orders for 237 locomotives were also noted, of which 24 were for export, and the approximate division of types was 48 passenger locomotives, 157 freight locomotives and 32 switching locomotives. The number of locomotives noted was exactly the same as for August. The car orders fell off by about 2,000 from the August record, which was a very large one for the season, but the September orders are still almost double those noted in July. The *Railroad Gazette* adds that orders are being withheld on account of the high prices, at least one large order being deferred and some others reduced in size, on this account.

The Sheet Mill Consolidation.

As has been the case in connection with other important consolidation enterprises, contradictory reports are being made concerning the project for the merging of the sheet mills. It appears certain, however, that the plan will not be carried out on the original lines. One option, that on a large plant, has expired, it is stated, and has not been renewed. It is a matter of doubt that the remaining options will be exercised, with this important int rest on the outside.

THE IRON TRADE REVIEW
AND
INDUSTRIAL WORLD.

DEVOTED TO MACHINERY, METAL-WORKING AND FOUNDR TRADES AND IRON AND STEEL MANUFACTURE.

PUBLISHED EVERY THURSDAY BY
THE IRON TRADE REVIEW CO.,
CLEVELAND, OHIO.

CLEVELAND, 27 VINCENT STREET.
G. H. GARDNER, President. A. I. FINDLEY, Editor.

CHICAGO:
1522 MONADNOCK BLOCK.
B. M. GARDNER, Western Manager.

PITTSBURG:
705 PUBLICATION BUILDING.
53-5 NINTH ST.
B. E. V. LUTY, Manager.
Telephone 1302.

Subscription (strictly in advance), $3 per annum. Foreign Rate, $4.
Advertising Rates Furnished on Application.

The Cleveland News Co. will supply the trade with THE IRON TRADE REVIEW through the regular channels of the American News Co.

ENTERED AT THE POST OFFICE AT CLEVELAND, O., AS SECOND CLASS MATTER

OCTOBER 19, 1899.

HIGH LAKE RATES FOR CARRYING ORE.

The owners of ore carrying vessels on the Great Lakes are to be congratulated on the events of the past week and the very considerable addition thus made to their income for next year. But whether the more remote consequences of the transactions of the week will be like cause for congratulation is much of a question. The splendid finish of the lake freight market in 1895 was profitable to the vesselmen while it lasted, and it brought also a pleasing prospect of high rates in the following year. But the $2 rate in the closing months of the season of 1895 made Mr. Rockefeller a vessel owner and helped to bring in three years of depressed vessel rates. Mr. Rockefeller's action in the present instance has a very different aspect, as viewed by vessel men, from that of his celebrated coup in the latter part of 1895. But the later effect upon the vessel men's fortunes will be precisely the same. There can be but one outcome of the performance of the past week—the rapid extension of the vessel holdings of every considerable shipper of ore. It is not to be expected that the largest Lake Superior mining interest, which has had to pay 25 cents a ton more than it would have paid, to move the bulk of its ore in 1900, will long continue in a position in which its vessel rate is made for it by outside interests. It would not be surprising if the season of 1901 saw it practically independent in its ore-carrying facilities. The certain result of the single season of high rates which the vessel men see ahead of them will be more vessels; and more vessels, without a corresponding increase in the material to be hauled, mean lower freights. And if on the heels of a large vessel-building movement, the tide of unusual prosperity in iron should begin to recede by the end of next year, the high rates for 1900 might easily be followed by a reaction, carrying them back to the low level that will cause season contracts for this year to be held in unpleasant remembrance.

THE LIFE OF THE IRON BOOM ABROAD.

The discussion now going on in the columns of our iron and steel contemporaries in England, as to the duration of the period of prosperity in iron and allied industries, which in Great Britain has now stretched over more than three years, is interesting from an American standpoint. The conditions here and there have points of difference, but it is a coincidence that the drift of the following comment from the London *Iron and Coal Trades Review*, particularly the latter portion of it, is very like some of the editorial deliverances on the present prosperity in iron and steel in the United States:

"The boom in the iron and steel trades has now lasted for upwards of three years. It began early in 1896, and we are now nearing the end of the third quarter of 1899. This is the longest boom that we have had in the iron trade for upwards of 30 years. There have during that time been three periods of exceptional prosperity. The first began in 1872, and lasted till about the middle of 1874. The second began in 1879, and lasted well into 1880. The third began in 1889, and continued until about the end of 1890. It will be noted, therefore, that the period of good trade which we are now enjoying has been quite exceptional in its duration. So also was the period of adversity which preceded it, and so also, unless we greatly err, is likely to be the slump which is bound to follow it. The wisest of men have been unable to give a satisfactory explanation of the alternating periods of good and bad trade, nor are the prophets any more successfully prescient in forecasting what is likely to happen in the future. At the present time it is naturally the future in which business men of all sorts and descriptions are most deeply concerned. If the most far-seeing were only able to predict with certainty what will happen in a year, a month, or even a week hence, opportunities for making large and rapid fortunes would be obvious. But these things are hidden from the wise and prudent, and are not even revealed unto babes. What is generally recognized by business men is the fact that there is as yet no material evidence of a reaction. It is known that most of the leading trades have still a very promising outlook, because of the great volume of work now on hand and the considerable inquiries made in respect of contracts yet to come. The resources of production in all our great industries are, however, so enormous that a very large volume of work could be overtaken in a very few months, and most industries are rarely able to see farther than six months ahead. . . .

"What, now, as to the future? It is a matter of common knowledge that there has been a very large expenditure in all these industries on extensions and improvements of plant. A large number of new collieries have been sunk. A number of new engineering and kindred works have been erected. Almost every manufacturing enterprise in the country has either built new shops or improved and extended its equipment. Probably the manufacturing resources of the country have been increased all round by 10 per cent at the least, in consequence of extended premises or improved appliances or processes. The increase may have been even larger than this, and in some cases it is likely to have been a good deal larger. What is to happen when the slump comes? Will all the new plant and the old find employment? Or will the old plant have to go to the wall and leave the field to the new? We believe that the law of the survival of the fittest will operate in the near future to an extent that has never been realized before, and happy, therefore, are they likely to be who have made judicious provision for the inevitable rainy day."

It is computed that the nominal advances in the prices of the coal, the pig iron and the finished iron and steel, produced in Great Britain in the past year, if secured on a whole year's product, would amount to 48½ millions pounds sterling. In pig iron alone the advance of the year has been 20s. a ton, which on 9½ million tons amounts to 9½ million pounds sterling. On coal the total nominal

advance would be £33,000,000, it is estimated, and on finished iron and steel £6,000,000. If similar methods of reckoning were adopted for the United States, it can be seen that a year of such prices as prevail today would add enormously to the enrichment of the labor and the capital engaged in iron and steel production. One of the most gratifying features of this condition is that foreign buyers have made so large a contribution to the added profits of our iron and steel industry.

THE rate of pig iron production in the United States on Oct. 1 if kept up for a year would give an output of 14,500,000 tons. It is evident that the production for the second half of the year will be more in excess of 7,000,000 tons than seemed likely when the official statistics for the first six months were gathered. In the first half the total was 6,298,167 gross tons. For the year the total promises to be close to 13,500,000 tons, or about 4,000,000 tons in excess of the record-breaking output now being counted on by best authorities, for Great Britain.

New Wire Company at Pittsburg.

The Union Steel Co. has been formed at Pittsburg by W. H. Donner, A. W. Mellon, R. B. Mellon, and a number of other capitalists whose name are for the present withheld. A cash capital of $1,000,000 has been paid in, it is reported, and the capital of the company will be increased later to $5,000,000, or possibly more. A complete plant for the manufacture of wire will be erected as soon as possible. The plans contemplate the erection at the start of one 600-ton blast furnace, to be followed later by another. A basic open-hearth steel plant will be erected of somewhat larger capacity, with mills to reduce the product for the rod mill, which will be of the Garrett semi-continuous type, having a capacity of 600 tons of rods a day. The wire drawing plant will have a capacity of about 400 tons a day, it being intended to sell part of the rods on the open market. A part of the wire product will be finished into nails. Contracts for the blowing and mill engines have already been placed with the Southwark Foundry & Machine Co., Philadelphia, and the Edward P. Allis Co., Milwaukee.

Representatives of the new company deny that it has any connection with the Carnegie Steel Co. or that any members of the latter company are interested in it; this in view of newspaper reports that have been widely circulated. It is stated that Webster City, three miles below Monongahela City, has been chosen as the location of the plant.

Lake Superior Iron Mines.

President Guthrie, of the American Steel Hoop Co., announces that the directors at their recent meeting authorized the purchase of a one-fifth interest in the Mahoning Ore Co., whose mine is at Hibbing, on the Mesbai range. He adds that the estimates of the ore on the property vary from 50,000,000 to 100,000,000 tons; that the shipments this year will be 750,000 tons and next year 1,000,000 tons.

The pneumatic haulage plant at the Aragon mine, Norway, Mich., described in these columns last week, will displace 14 mules. When the compressed air locomotive reaches its guaranteed maximum duty it will perform work that would require 20 mules, the estimate being based on 40 per cent longer hauls than have been made heretofore.

The Oliver Iron Mining Co. has removed a large steam shovel from the Mountain Iron to the Oliver mine on the Mesabi range, preparatory to the resumption of work at the latter, nothing having been done this season. Shipping operations will be carried on for the present.

THE Reddin Iron Works, Syracuse, N. Y., are being enlarged; a new building 50x80 feet is going up.

PERSONAL.

President C. M. Schwab, of the Carnegie Steel Co., Ltd., made an address at Loretto, Pa., on Oct. 10, at the unveiling of the bronze statue of Father Gallitzin which Mr. Schwab had presented to the local Catholic church founded 100 years previous by the pioneer prince-priest. Loretto was Mr. Schwab's boyhood home and his summer residence is there. Announcement was made in connection with the celebration that Mr. and Mrs. Schwab will build a new St. Michael's church at Loretto, to cost $50,000.

Second Vice-President A. M. Shook, of the Tennessee Coal, Iron & Railroad Co., met with a runaway accident last week, resulting in the fracture of a leg and other injuries.

J. N. Barr, superintendent of motive power of the Chicago, Milwaukee & St. Paul road, has tendered his resignation, to take effect Nov. 1. Mr. Barr will accept a similar position with the Baltimore & Ohio, with headquarters at Baltimore.

President W. E. Reis, of the National Steel Co., went to Washington early in the week to appear as a witness before the Industrial Commission.

A portrait and biographical sketch of Chairman H. C. Frick appear in the October number of *Cassier's Magazine*.

J. C. Tate, of Tate, Howard & Co., one of the largest tool handlers in England, is now in this country. His firm represents several American manufacturers and is particularly interested in pneumatic tools. Mr. Tate confirms the news relating to the British Admiralty's decision to adopt American riveters and other tools driven by compressed air.

S. Kunisawa, of Tokio, Japan, a civil engineer in the employ of the Imperial government railway, and B. Tamoki, an electrical engineer, of Tokio, have been in Pittsburg this week to visit the plants manufacturing railway material, including steel cars, air brakes, locomotives and rails. They state that large orders in these lines will be placed within the next few months.

Dr. F. L. Slocum, president of the Gas Engineering Co., Pittsburg, returned this week from the Cripple Creek gold fields.

Theodore Robinson, superintendent of the Joliet mills of the Illinois Steel Co., is to be made general manager of the company's Western mills on Jan. 1, it is reported. The mills included are those at Joliet, South Chicago, Bridgeport, and Bay View.

Most of the contracts have been placed for the Carnegie Steel Co.'s additions recently announced. The Southwark Foundry & Machine Co., Philadelphia, will make the engines for the blast furnaces and blooming mill; the Riter-Conley Mfg. Co., Pittsburg, will build the two blast furnaces, and the Keystone Bridge Co. will erect the buildings and construct the bridge. Work on the buildings and the bridge has been commenced.

AT the Edgar Thomson plant of the Carnegie Steel Co. improvements in the motive power are contemplated which will cost about $100,000. At the D and E furnaces six blowing engines will be replaced by eight of a more powerful type, and the hot blast stoves will be changed to give more heating capacity.

THE Monessen Foundry & Machine Co., Monessen, Pa., is in the market for a 48-inch radial drill, second hand preferred.

PLANS have been made for increasing the output of the Ohio steel plant of the National Steel Co. at Youngstown, O. Three stands of rolls will be added to the 15 in the finishing department, and it will be transformed into a continuous mill, making it possible to roll at one time large and small billets and tin and sheet bars. New hot beds and additional shears will be provided. The changes will make possible an output of 2,200 tons in 24 hours.

IT is understood that the independent woven wire fence companies have already started to carry out their plans to manufacture their own raw material, and have purchased some second hand engines and a second hand three-high blooming mill.

THE WEEK IN IRON AND STEEL STOCKS.

Denison, Prior & Co , in their weekly iron and steel letter say: "There is but little to say in regard to the action of the steel stocks during the past week. It might be remarked, however, that the earnings keep up, and the stocks keep down; otherwise the situation is without feature. The bull talk on Tennessee Coal & Iron continues as strong as at any time since the organization of the pool. It is now said that the first dividend on the common stock of the company will be paid on the new capitalization, and it is also said that the holders of the present common stock will not have the pleasure of receiving a dividend check from the company. With all the talk regarding the earnings of Tennessee Coal & Iron one thing has been neglected, and that is, the earnings from their coal property, which about take care of the fixed charges of the company. While the outlook for Tennessee Coal & Iron may be very promising, and while it may be true that the stock will have a still further advance, it is also true that the stock has risen to such a height under the manipulation of the pool wihch now controls it that it is very likely to fall of its own weight. There are other stocks on the list representing iron and steel plants which are earning far in excess of Tennessee Coal & Iron Co., and which have not been manipulated to such an absurd market position. The National Steel & Tin Plate issues might be mentioned as being of this latter character of stocks, and under proper market conditions, stocks of this character are bound to have a rise.

"As the money situation is showing an increased tendency towards ease and as the time of the year when easy money is generally at hand is now approaching, the probabilities favor a range of from 4 to 6 per cent in call loans. The two conditions which make for the unsettlement of the market, are the Transvaal war and the approaching elections in November. When the Transvaal war is well under way, and the elections are out of the way, better conditions and more satisfactory markets will undoubtedly be seen. Until that time the chances are that the present unsatisfactory condition will continue."

Fluctuations of the Week and the Year.

The following table shows the fluctuations in iron and stee stocks in the week ending with Monday, Oct. 16, and in the present year:

Name.	WEEK.				YEAR.			
	Open	High	Low	Close	High.		Low.	
Am. Car & Fdy	16	16⅜	15	15	21⅞	May 25	15	June 15
Am. Car & Fdy pr.	62	63⅜	60	60⅜	68⅜	Sept. 7	56⅜	June 16
Am. Steel & Wire..	50⅞	54¾	50⅜	52⅛	72	May 4	45	Feb. 8
AmSteel & Wire pr	96	97¾	94¾	96	106¾	Mar. 13	92½	Feb. 8
Am. Steel Hoop.....	42½	44⅛	42⅜	43	45⅛	Sept. 25	24	May 24
Am. Steel Hoop pr	84¾	85½	84	84¼	86¾	Sept. 14	70	May 13
Am. Tin Plate.....	37⅝	39	37	37	52¾	April 4	33	May 24
Am. Tin Plate pr..	86¾	86¾	85¼	85½	99½	Feb. 8	81	June 1
Col. Fuel & Iron...	55¼	56¼	52½	54½	64	Sept 11	30½	Feb. 8
Federal Steel.....	54⅜	56	53	54¼	75	Apr. 3	46⅜	Feb. 8
Federal Steel pr....	78	79	76	77¼	93¼	April 3	72½	May 13
National Steel.....	51¾	52¾	50	50¾	63	April 24	43¾	June 2
National Steel pr..	96	96	94¼	95	99⅜	Aug. 11	85	May 15
Pressed Steel Car..	57¼	58¼	57½	58¼	61	Aug. 14	44¾	June 1
PressedSteelCar pr	89½	89½	88½	89	91	Sept. 7	78	May 25
Republic Steel	26½	28¾	26¼	27	33⅞	Sept. 26	22¾	Aug. 26
Republic Steel pr..	72	73	70	71	79	Aug. 29	70	Oct 2
Tenn. Coal & Iron	116	118⅛	113	116⅛	126	Sept 11	36	June 14

Notes.

The regular quarterly dividend of 1¾ per cent of the preferred stock of the American Steel Hoop Co. has been declared, payable Oct. 30 to stockholders of record Oct. 20.

The National Tube Co. is preparing to list its stock on the New York Stock Exchange, and a statement is being prepared in accordance with the Exchange rules. An effort is being made also to have the securities of the United States Cast Iron Pipe & Foundry Co. listed on the Exchange, and there is a movement on foot for a pool to support the stock until a market is made.

It is stated in New York that additional deposits and pledges of Sloss Iron & Steel stock made since the extension of time, have made the total number of shares deposited over 90 per cent of the entire issue. To make the so-called Sloss-Sheffield plan operative, required but 51 per cent, so that the above makes it nearly unanimous.

The Superior Drill Co., of Springfield, O., will install a cupola with a capacity of 25 tons daily.

THE SELLING SIDE OF THE TRADE.

Representatives of Well Known Iron and Steel and Equipment Firms.

Probably no representative of the foundry equipment trade in the Central West has been more active in the foundry association movement than Samuel T. Johnston, manager of the equipment department of the S. Obermayer Co., with headquarters in Chicago. Without his own seeking Mr. Johnston was chosen secretary of the Western Foundrymen's

SAMUEL T. JOHNSTON.

Association a few years ago, and for two terms did excellent work in building up the organization and making it of practical value in the Middle West. He was born in Glasgow, Scotland, in 1866, and 11 years ago came to the United States. He became connected with the Whiting Foundry Equipment Co. and after nearly ten years with that company entered upon his present work. His acquaintance is wide and his popularity is co-extensive with his acquaintance.

Lake Erie Site for a Basic Steel Plant.

The prospectus of the Holley Steel Co., capital $5,000,000, has been under consideration recently by a number of Cleveland capitalists, the data having been prepared by well-known metallurgical engineers. The names already mentioned in connection with the enterprise are an indication that once undertaken it will be carried through on a basis insuring success from both commercial and technical points of view. Conservative figures have been made as to possible profit, one set based on costs and selling prices at the lowest level of the depression of recent years, and another set based on costs of raw materials today and current market prices of finished products. Both show that the economies of the Lake Erie site are quite as pronounced in the case of basic as of Bessemer steel.

The proposed site is in the Fairport, O., district, at the mouth of Grand river, on the opposite side of the river from the present Fairport docks. A tract of 1,000 acres of land on the west side of the river is under option. The plant proposed includes a blast furnace of 600 tons capacity, for the manufacture of basic iron; ten 50-ton basic open-hearth furnaces, a modern bar mill and a plate mill. The product will be billets, slabs, bars and plates. Grand river is dredged to a depth admitting the largest lake vessels, and government work done in recent years at this harbor makes the building of docks for the proposed plant a matter involving comparatively little labor and expense.

ANNOUNCEMENT is made of the advance in pig iron rates promised for Nov. 1. This will effect Southern iron shipments to points North and West except Cincinnati, St. Louis and New York. Whether rates will be raised south of the Ohio river has not been determined.

THE National association of woven wire fence manufacturers, at a recent meeting at Chicago re-elected E. F. Shellaberger, of DeKalb, Ill., president, and E. E. Kilmer, of Chicago, secretary. The association decided to advance the price of its products.

MOLDING MACHINES AND THE UNION.

In a recent issue *The Iron Trade Review* commented upon the action taken by the Indianapolis convention of the Iron Molders' Union, advising all members to accept work on molding machines and seek to bring out their highest possibilities. This was a reversal of the policy of the union for many years, and the action was taken in the face of some opposition, though the officers of the union appeared to be quite a unit upon the recommendation. In our comment we said that the success of the effort of the union to seek now to control machines after having opposed them, would depend much upon the price basis; that foundrymen who had introduced machines against the opposition of skilled molders and had trained laborers to use the machines rapidly and effectively, could not be expected now to hand over the benefits of machines to union workmen. The *Iron Molders' Journal* reprints these comments and has the following to say, which indicates that the campaign of education within the union molders' ranks is being carried on with utmost tact and conciliation:

"It is not anticipated by the officers of the National Union that the resolutions adopted by the Indianapolis convention will settle the question. They are well aware that many obstacles they foresee, and many which they do not forsee, will have to be overcome before the policy outlined at Indianapolis can be made effective. The question of wages is certainly one which will require careful handling, but it seems but reasonable to presume that a skilled mechanic, an expert at his specialty, as most of our members are, should be able to operate a machine to much greater aduantage with a less percentage, both of initial and subsequent loss, than the laborer, who molds simply as an automaton, would. And we have little fear, when the foundrymen realize that molders will honestly endeavor to bring out the best possibilities of the machine, that they will throw no obstacles in the way of his doing so, but will welcome him as an operator preferable to the unskilled one that chance may provide.

"The first and most important step in the movement is, without the shadow of a doubt, to convince the molder that it is to his interest to operate the machine to its best advantage. It must, if he be a reasonable man, be already apparent to him that, while his antagonism in the past may have retarded the progress of machine development, it could not stop it, and that, in spite of him, it is making a place for itself in foundry economy. Why, then, should he persist in a course that simply displays his impotency and arouses antagonisms that operate to his serious hurt? As was to be expected, the agitation contingent upon this declaration of policy on the part of our organization toward the machine, has attracted the attention of molding machine manufacturers, and one of them wrote to President Fox, commenting upon the action of the convention, and in a very candid manner expressed his views upon the situation as it appeared to him. Among other things he said:

"'If it shall be proven possible for the molder to abandon what he has grown to consider a standard for "a fair day's work," in the strong light of the molding machine's ability to save time, and not seek to curtail its usefulness by a vain attempt to "control" it and its owner, then I agree heartily with you that it is most fit he should use machines just as he uses his tools, and no one will oppose him. Give the manufacturers individually and collectively a guarantee, secured by the good faith of men they know they can trust, that your molders will, to quote your own words, "bring out the best possibilities" of the machines, and both labor and capital will benefit in the result.

"'There can be no question but that the molder can, if he will, make a molding machine pay, better than a laborer, for there are abundant instances where the laborer is, with the help of the machine, making fair molder's wages, and there are other instances where the molder could get a new job running on a machine successfully in much less time than an inexperienced laborer, if he would honestly try, and save the employer's melting iron for scrap till the laborer has gathered the experience the molder always had. I prophesy success for your new plan, if entered upon with as much thought for the owner of the molding machine as for the man who runs it, and I prophesy failure if entered upon with a selfish thought for the molder only.'

"There is a lot of good, sound logic in these paragraphs, and, in weighing it, we should not allow our judgment to be prejudiced by the knowledge that it came from an interested source. The question should be considered broadly and intelligently. While the molder has not sought to boycot or actively oppose the advent of the machine as some misguided craftsmen have done, he has been criminally indifferent to it, has not given its merits or possibilities any consideration, and hence has been slow to awaken to a sense of his duty in the case. It is ours to arouse their slumbering senses, to point out the mistakes of the past and the remedy for the future. Whether you handle a rammer or pull a lever, whether you make a piece weighing tons or ounces, there is a bond of interest common to all. Are you alive to it?"

Spring and Axle Consolidation.

The negotiations for the formation of the buggy spring and axle combine are said to have been practically completed. Options have been obtained on between 30 and 40 spring and axle plants, and it is said the combine will control 85 per cent of the capacity. The entire capital will not be more than $10,000 000. It is understood that the Pittsburg Spring Co., owned by William G. Park, president of the Park Steel Co., one of the largest concerns making both axles and springs; the Dexter Spring & Gear Co., of Pittsburg, and the Liggett Spring & Axle Co. of Allegheny, also owned by Mr. Park, will be included. The La Belle Steel Co. manufactures axles, but it is said will not go into the consolidation.

The plants that are understood to have been examined by the combine experts and optioned are: Concord Axle Co., Penacook, N. H.; Dalzell Axle Co., South Egremont, Mass.; Miller Axle Co., Mt. Carmel, Conn.; Spring Perch Co., Bridgeport, Conn.; T. W. Wurster & Co., springs and axles, Brooklyn, N. Y.; J. W. Merrill, spring repairer, New York; Daniel Delaney & Son, springs, Norwalk, N. J.; I. & J. Laforge, springs, Rahway, N. J.; Advena & Trankle, axles, Philadelphia; William and Harvey Rowland, springs, Philadelphia; Thomas Insell, springs and axles, Philadelphia; Keystone Spring Works, Philadelphia; Standard Axle Works, Millersburg, Pa.; Dauphin Axle Co., Elizabethtown, Pa.; F. Gardner's Sons, axles, Carlisle, Pa.; Davis W Schuler & Son, Amsterdam, N. Y.; the Penn Spring Works, Baldwinsville, N. Y.; Lee, Cowan & Bowan, springs, Syracuse, N. Y.; Hartford Axle Works, Dunkirk, N. Y.; Scranton Axle Co., Scranton, Pa.; Sheldon Axle Co., Wilkesbarre; Fo est City Spring Co., Cleveland; Cleveland Axle Co., Canton, O.; Canton Spring Co., owned by the Pittsburg Spring Co.; Hay Axle Co., Coshocton, O.; Spear's Axle Co., Wheeling; Hess Spring & Axle Co., Carthage, O.; Pittsburg Spring Co., Cincinnati; Detroit Steel & Spring Co.; Armstrong Mfg. Co., Flint, Mich.; Lewis Spring & Axle Co., Jackson, Mich.; M. Huggins, Racine, Wis; Tuthill Spring Co., Chicago; E. A. Anstead, springs and axles, Connersville, Ind.; Drummond Mfg. Co., Louisville, Ky., and Pittsburg Spring Co., Hammond, Ind. A. Leo Weil, of Pittsburg, attorney and B. I. Greenebaum, of Chicago, the promoters, have been busy for some time working out the details, and N. C. Wilson, of Pittsburg, consulting engineer, has been working for months appraising the different plants. The Detroit plant has a rolling mill.

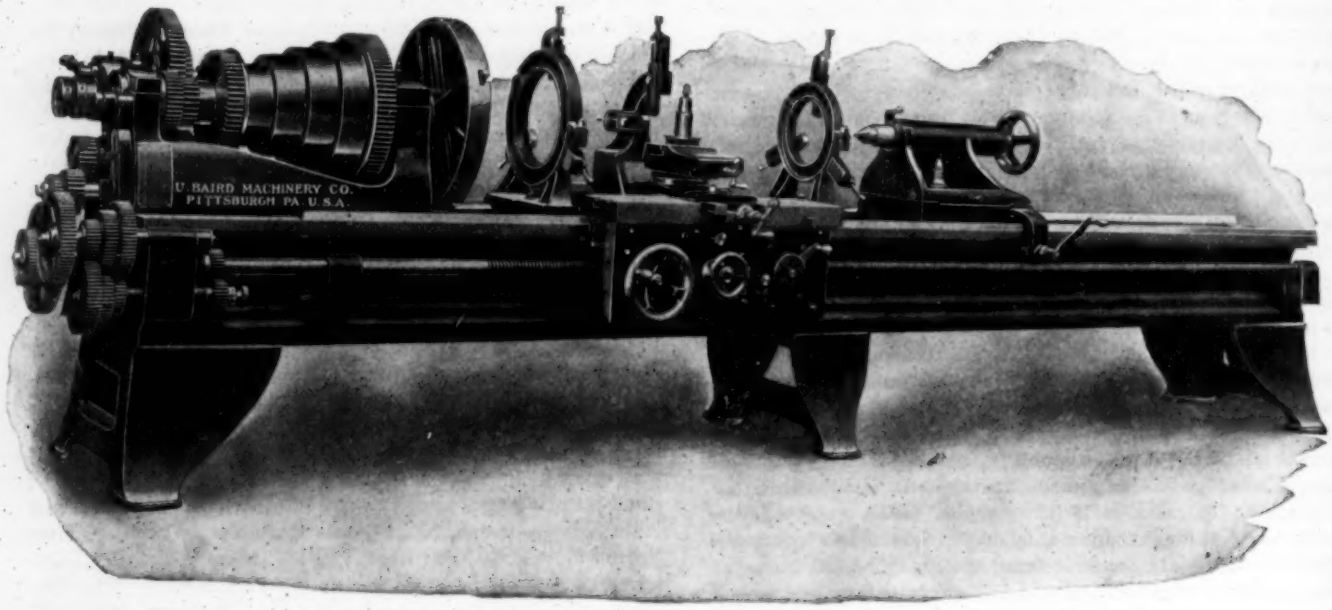
Galvanized Wire Nails.

Provision is made against the rusting out of shingle nails, which leaves the shingles without support, in the galvanized steel wire nails manufactured by the American Steel & Wire Co. The nails are galvanized after they have been cut, so that every portion of the nail—head, shaft and point—is thoroughly covered with a very heavy coating of zinc, rendering the nails absolutely rust proof. Shingle nails, slating nails, roofing nails, fence nails, car nails and others particularly exposed to moisture, when thus coated are referred to as practically everlasting, while the cost is but a trifle more than that of unprotected nails. The American Steel & Wire Co. recently distributed a large number of sample cards on which were ordinary nails and their duplicates which had been galvanized. All of these nails had been exposed to the weather for the same length of time and the card was a striking object lesson on the rust-proof character of galvanized nails. These sample cards can be obtained by addressing the Chicago office of the American Steel & Wire Co.

DOUBLE BACK GEARED ENGINE LATHE.

The 26-inch double back geared engine lathe shown in the accompanying illustration is one of the special tools of the U. Baird Machinery Co., of Pittsburg, being designed to take the place of the Gleason Tool Co.'s 26-inch lathe, which is no longer made. It is calculated for heavy and exacting duty, especially such work as is required in oil country operations. An unusually large hole through the head stock shaft is provided. The head is very heavy and is strongly ribbed. The spindle, running in large bronze bearings, is made of best crucible cast steel. The back gearing is exceptionally strong and has a ratio of about 18 to 1. The cone, which is of large diameter, has four steps, with a uniform ratio of increase from lowest to highest. Heavy feed works are provided, in keeping with other parts—wide face gearing with large bearings driven by a splined lead screw of large diameter. A triple range of threads and feeds is obtained without change of gearing, by means of a pull spline.

The direction of the feed is changed in the apron and a positive locking device prevents more than one feed being engaged at one time. Threads from 1 to 32 are cut and feeds are from 1 to 64 to the inch. The carriage is unusually heavy, with long bearings on the tracks. It is furnished with compound rests. Taper packings are used and all parts are accurately fitted. The taper attachment is heavy and has easy adjustment; it can be used at any desired place on the lathe. Any taper up to 4 inches to the foot can be turned. The tail stock is stiff and rigid, with plenty of material in it and a large diameter spindle. Movement along the bed is by means of track and pinion. The countershaft pulleys are 18 inches diameter and 5-inch face. The weight of the machine on a 16-foot bed is 8,350 pounds.



DOUBLE BACK GEARED ENGINE LATHE.

It is stated that a combination is proposed among the various manufacturers of woven wire fencing and other wire goods, which are dependent upon the American Steel & Wire Co. for a supply of wire. It is stated that if the combination is effected a plant will be erected, probably in Pittsburg, for the manufacture of wire.

The biennial convention of the National Brotherhood of Electrical Workers, formed in St. Louis in 1891, is being held in Pittsburg this week. Between 150 and 200 delegates are expected to attend.

The Austin Separator Co., of Detroit, Mich., one of the oldest in the field, writes that during the month of September its business was considerably the largest in its history. This on home orders alone. At the same time, export trade was more than quadrupled. The year 1899 will probably be the company's banner year for business.

LIME AND MAGNESIA AS DESULPHURIZERS IN THE BLAST FURNACE.*

BY O. R. FOSTER, BROOKLYN, N. Y.

The use in the iron blast furnace of slags high in magnesia has been generally condemned, not only on the ground that magnesia renders the slag less fusible, but also because it is said to have less power to remove sulphur from the iron. Percy says the use of dolomite as a flux should obviously be avoided, because magnesia "tends to induce infusibility," but says nothing of its relation to sulphur in the charge.

Bell suggests the absorption of SO_2 by lime and magnesia in the blast furnace, but leads the reader to suppose that the really active agent is lime. Howe says: "The greater desulphurizing power of lime than of magnesia is illustrated by the Illinois blast furnace practice, in which the substitution of calcite for dolomite materially diminished the percentage of sulphur contained in the cast iron." Phillips and Bauerman say that "magnesia . . . . has no power of removing sulphur."

Ledebur asserts that the desulphurizing effect of magnesia is smaller than that of lime, magnesium having but little affinity for sulphur, but adds: "Nevertheless, a basic magnesian slag will likewise take up sulphur from the iron." He cites in this connection experiments of his own, in which an iron containing 2.33 per cent of sulphur was smelted first with a lime-slag, and afterwards with a slag in which the chemical equivalent of magnesia had been substituted for lime—the removal of sulphur in the latter case being smaller (yet not much smaller) than in the former. On the other hand, there are instances in which magnesian slags have been used with success. Thus Mr. Frank Firmstone has published tables from long practice in Eastern Pennsylvania and elsewhere which show that "for about the same content in silicon the iron made with dolomite is pretty regularly lower in sulphur than that made with limestone." Mr. Firmstone cites other authorities for the same experience, and appeals to the general practice in the Lehigh valley. Dr. W. B. Phillips says that in Alabama "the use of dolomite was a decided advantage, especially in the elimination of sulphur."

Many other authorities to the same effect could be quoted at length; but enough has been given to show that there is some difference of opinion and practice regarding the use of magnesian slags. A careful study of what has been written on the subject leads to the belief that other conditions may have affected, in many instances, the results reported. At all events, it seemed to the writer pertinent and desirable to make a series of laboratory experiments, designed to determine directly, if possible, under uniform conditions, the desulphurizing action of lime-magnesia silicates, carrying various definite amounts of magnesia, when these silicates were fused together with sulphurous cast iron.

The experiments were made as follows: Quantities of one

* Read at the California meeting of the American Institute of Mining Engineers, September, 1899.

and the same iron were melted in carbon-lined (brasqued) crucibles, with silicates of calcium and magnesium, and the resultant iron was analyzed for sulphur. These conditions represent, in a measure, those existing in the crucible of an iron blast furnace; that is, we have molten cast iron lying quiescent in contact with an excess of carbon and covered with a blanket of slag. The iron was in the form of fair-sized shots, which ran down through the slag as they melted, thus securing intimate contact between the iron and the accompanying silicate. The pure cast iron used in these experiments was prepared by carburizing, in a graphite crucible, some Swedish wrought iron, brand ("S"), adding the sulphur in the form of iron sulphide, and silicon in the form of carborundum. The molten iron was poured into a large tank of water through a screen, with four meshes to the linear inch; the iron was thus granulated, putting it into a form convenient for weighing. The slag-making materials were lime (CaO), "C.P. from marble," magnesia (MgO), "pure," and silica (SiO_2), "nat. praep. pure," purchased from the chemical firm of Eimer & Amend. All were well pulverized. The proper mixture to form a slag having been made, it was pressed down solidly into the crucible, and the iron shots were placed on top. The crucibles so filled were heated in a furnace using illuminating gas and a forced blast. The temperature obtainable was from 1,400° to 1,550° C., as indicated by Le Chatelier's thermo-electric pyrometer. The crucibles remained in the furnace for three hours, after which the charges were poured into water, in the manner described above.

EXPERIMENT NO. 1.

Three portions of iron of 100 grammes each were melted with

(*a*).	100 grammes of	36 CaO (40.19)	16 MgO (12.85)	39 SiO_2 (46.96)
(*b*).	150 "	28 CaO (32.06)	24 MgO (19 77)	39 SiO_2 (48.17)
(*c*).	100 "	20 CaO (23.51)	32 MgO (27.06)	39 SiO_2 (49.43)

The first line of each section in the above table gives the chemical composition of the silicate; and under each molecular symbol the percentage of the substance in the mixture is given in parenthesis.

The sulphur percentages in the above iron were:

	Before Fusion.	After Fusion.	Percentage of Sulphur Removed.
(*a*)	0.56	0.61	89.0
(*b*)	0.56	0.254	54.6
(*c*)	0.56	0.162	71.0

EXPERIMENT NO. 2.

Two portions of iron of 100 grammes each were melted with

(*a*).	150 grammes of	9CaO (34.75)	4MgO 11.11	13SiO_2 54.14
(*b*).	150 "	7CaO (27.63)	6MgO 17.04	13SiO_2 55.33

The sulphur percentages in this iron were:

	Before Fusion.	After Fusion.	Percentage of Sulphur Removed.
(*a*)	0.56	0.336	40.0
(*b*)	0.56	0.320	42.8

EXPERIMENT NO. 3.

Two portions of iron of 100 grammes each were melted with

(*a*).	150 grammes of	28CaO (34.02)	8MgO 7.00	45SiO_2 58.98
(*b*).	100 "	12CaO (15 42)	24MgO 22.20	45SiO_2 62.38

The sulphur percentages in this iron were:

	Before Fusion.	After Fusion.	Percentage of Sulphur Removed
(*a*)	0.56	0.369	34.1
(*b*)	0.56	0.454	18.9

EXPERIMENT NO. 4.

Two portions of iron of 100 grammes each were melted with

(*a*).	100 grammes of	11CaO (35.33)	MgO 2 31	18SiO_2 62.36
(*b*).	100 "	9CaO (29.44)	3MgO 7.06	18SiO_2 63.50

The sulphur percentages in this iron were:

	Before Fusion.	After Fusion.	Percentage of Sulphur Removed.
(*a*)	0.56	0.376	32.8
(*b*)	0.56	0.272	51.4

Tabulating the results obtained above, and giving the values obtained by duplicate analyses, we have:

TABLE I. SULPHURIC CONTENTS OF RESULTANT IRON.

The iron used contained initially 0.56 per cent sulphur. The ratio given in the upper line of the table is that of oxygen in bases to oxygen in acid (SiO_2).

Experiment No.	1.	2.	3.	4.
Ox. ratio of	1:1.5	1:2	1:2.5	1:3
Silicate.	Sulphur. Per Cent	Sulphur. Per Cent.	Sulphur. Per Cent.	Sulphur. Per Cent.
Low MgO	0.061 0.061	0.336 0.337	0.377 0.361	0.385 0.367
Medium MgO	0.255 0.254			
High MgO	0.166 0.198 0.123	0.315 0.325	0.456 0.453	0.267 0.277

TABLE II.—PERCENTAGES OF CaO AND MgO CORRESPONDING TO TABLE I.

Experiment No.	1.	2.	3.	4.
Ox. ratio of	1:1.5	1:2	1:2.5	1:3
Silicate.	Per Cent.	Per cent.	Per cent	Per cent.
Low MgO	CaO 40.19 MgO12.85	CaO 34.75 MgO 11.11	CaO 34 02 MgO 7.00	CaO 35.33 MgO 2.31
Medium MgO	CaO 32.06 MgO19.77			
High MgO	CaO 23.51 MgO27.06	CaO 27.63 MgO 17.04	CaO 15.42 MgO 22.20	CaO 29.44 MgO 7.06

A more extended investigation would doubtless be necessary before any final deductions could be made. Table I. indicates, however, the well known law, that the more basic the slag, the greater its sulphur-removing power. For in going from the right to the left of the table, that is, from the more acid to the more basic silicates, there is a decrease in the residual sulphur-values, indicating a greater sulphur-removal. The value given in the lower right-hand corner of Table I. is, however, an exception to the above statement.

Under experiment No. 1 it appears that the high-lime slag removed most sluphur; that the highly magnesian slag removed somewhat less; and that the "medium" slag removed still less. This may indicate that we can adjust the ratio of lime to magnesia so as to produce a silicate with a desired sulphur absorbing power. In experiment No. 2 there is hardly any difference in the values. The percentage of magnesia did not vary much. In experiment No. 3 the high lime silicate removed the most sulphur, even allowing for its greater amount (150 grammes against 100 of the highly magnesian slag). In experiment No. 4 the highly magnesian slag removed most sulphur; but, as in No. 2, the percentage of magnesia does not vary in this experiment to any considerable degree. The variation in the percentage of magnesia is limited by the capacity of the furnace to melt the silicates; the extremes here given were determined by experiment to be the best. It may be that the high-lime slag has a maximum desulphurizing action for a certain acidity, while for another degree of acidity the high-magnesia slag is best. Further experiments would shed light upon this suggestion. It is to be noticed that in experiments Nos. 1 and 3, in which the greatest variation in the percentage of magnesia occurs, the greatest quantity of sulphur was removed by the slag high in lime. Since, in these experiments, the percentage of magnesia varies within wider limits than in the other two, greater weight must be given to their results. Hence, it might appear that slags high in lime are the most efficient desulphurizers.

The results of this investigation, however, do not warrant the assertion of a final conclusion. More elaborate experiments operating upon larger quantities of material, and with a grhater variety of slags, would give evidence, no doubt, which would permit sound and definite deductions.

The sulphur determinations above reported were made by the *aqua regia* method. Considerable difficulty was experienced in getting the iron into solution. The shots of metal became quickly coated with a layer of silica, which protected them from the further action of the acid; and resort was had to the use of hydrofluoric acid, in order to obtain solution in a reasonable length of time. This difficulty led me to suppose that, at the high temperature employed, some silicon was

reduced from the slag and entered the iron. If this was the case, the acidity of the various silicates was altered somewhat. It is judged, however, that this possible change in acidity was not great enough to affect materially the results obtained.

As has been remarked, two or three crucibles were placed in the furnace and heated at the same time. Hence the temperature necessary to melt the most refractory silicate had to be employed. The most fusible slag was therefore heated to a degree above that required for proper fusion. This introduces another variable into the discussion. The only way to avoid this difficulty would have been to heat each charge separately—a course which, in these experiments, time did not permit.

NEW HOT MALLEABLE ALLOY OF COPPER.

Johannes C. Bull, a Swede, living in London has recently produced an alloy of copper which is an exceptional to the rule that alloys of copper, tin, and zinc are brittle when hot and cannot be forged. The alloy in question is patented in the United States. It can be rolled or forged at red heat and yet have the hardness necessary for general use. The inventor thus states his claims:

"According to my invention I use copper as nearly chemically pure as is commercially and practically obtainable, and as the purity of the copper is absolutely essential for the production of my improved alloys, I use the best brands of electro-deposited copper, which, so far as I know, is the purest copper that is commercially obtainable, and to this copper I add from 2 to 4¼ per cent of tin, stir well, and pour in the ordinary way into ingots, which are capable of being rolled, forged or drawn into bars, sheets, tubes and wire.

"In practice, I find it useful to add a small proportion of deoxidizing material—for instance, phosphorus, preferably in the form of copper phosphid—to the copper before adding the tin. When phosphorus is used as a deoxidizing agent, it is however, necessary to take care that the amount added is not so great that any appreciable quantity of it is left unoxidized in the alloy, and in no case should more than .1 per cent of phosphorus be added to the copper if the highest mallaebility is desired. In proportion as more phosphorus is added the malleability at a red heat will be reduced and the metal hardened, which for many purposes is disadvantageous.

"Sodium may also be used beneficially as a deoxidizing agent in the form of sodium-tin, the purer the better. This deoxidizing agent has the advantage that if an appreciable quantity thereof is left unoxidized in the alloy it does not affect the malleability to the same extent as phosphorus. As a rule, not more than .15 per cent to .2 per cent of sodium should be added. Where special means are taken to melt the cast the alloy in a non-oxidizing atmosphere, the addition of the deoxidizing agent becomes unnecessary, except where harder alloys are desired even at the cost of some reduction in malleability.

"I have also discovered that the addition of mercury in very small quantities, greatly improves such alloys of copper and tin, rendering them more tough and malleable. In making my improved alloys containing mercury, I prefer to first amalgamate the mercury with the tin, using from 2 to 4 per cent of mercury. I add up to about 4¼ per cent of this tin amalgam to the copper, which may or may not have had a small proportion of deoxidizing material added to it.

"By this invention a large range of new and useful malleable alloys of copper and tin can be produced."

COLD SAW CUTTING OFF MACHINE.

Patents are now being secured by the Newton Machine Tool Works, of Philadelphia, for a combination cold saw cutting off machine, of which the accompanying illustrations will give a good idea, both as to construction and operation. The machine is the outgrowth of the general changes which the manufacturers have found that the cold saw cutting off business necessitates, and combines all the features of their other types of old saw cutting off machines. Fig. 1 gives a general idea of the construction of the tool. The working part of the machine is the same as in the company's standard machines. The new features consist in the adjustable table and the carrying of the saw in the saddle, which feeds forward with a variable feed, controlled by lever, and instantly adjustable from one extreme to the other. By releasing the clutch and operating the friction quick return, the carriage can be quickly adjusted back in position ready for placing new work on the work table. The main work table of the machine, which is made low, has an adjustment for convenience in moving work after it is clamped. On top of the work table rests an auxiliary table, which is tongued to the work table, and can be adjusted in any position or removed.

The plan drawing, Fig. 2, illustrates an I beam being cut off in the center at an angle of 45 degrees. If greater angle than this is desired, the top of the table can be removed entirely. For miscellaneous work, such as steel castings, the table can be removed and the castings clamped in a convenient position for cutting off risers.

The machine is built in four sizes, with saws 21 inches, 26 inches, 32 inches, and 36 inches in diameter; with the following maximum capacities for cutting I beams on mitre cut, as illustrated. No. 1 machine, 12 inch I beam; No. 2 machine, 15-inch I beam; No. 3 machine, 20-inch I beam and No. 4 machine, 24-inch I beam. On top of the auxiliary table the machines have a maximum capacity: No. 1 machine, 4½ inches by 16 inches; No. 2 machine, 6 inches by 24 inches; No. 3 machine 8 inches by 32 inches, and No. 4 machine 12 inches by 38 inches.

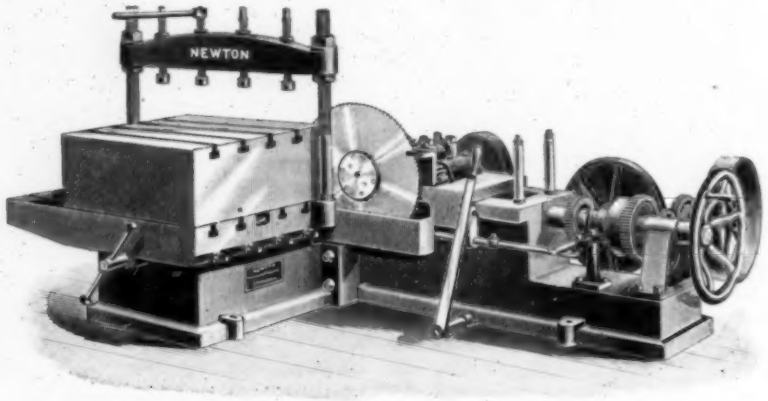


FIG. 1.

Prosperous Belleville, Ill., Industries.

J. C. Born & Bros., of Belleville, Ill., are doing an increasing business in the manufacture of emery grinders, sensitive drills and steam engines. They have been established since 1883 and are about to add new machinery that will permit them to make seven different sizes of engines. They are well known to the trade through their Crescent emery grinder, three sizes, Crescent sensitve drill, and Crescent vertical steam engine. They have just completed a 25 h. p. engine for Evansville, Ill.

Gundlach & Rumpel, of Belleville, report a large increase in work as compared with last year and a good outlook for the future. They employ 40 men and turn out fine gray iron castings for machinery and small work. The firm was established about two years ago and dispose of their product throughout several of the Central and Western States.

The Excelsior Foundry Co., of Belleville, Ill., has about doubled its capacity since last year, and is now doing an extensive business in malleable castings in addition to gray iron castings. Railroad work and hollow ware are the principal products and are sold over an extensive territory. The company was established in 1891 and occupied its new plant about one year ago. Twenty-five men are now constantly employed, being the limit of their present capacity.

STARTING A MALLEABLE FOUNDRY.

There has been unusual activity in the past year in the building of plants for the manufacture of malleable cast iron. The demands of the agricultural implement manufacturers and of the railroads have been beyond precedent, and the capacity of existing malleable plants has been inadequate. Manufacturers who have made a success of the malleable business have been extending their facilities. New companies have been formed, in which men expert in malleable work have embarked. And some cases are known in which the field has seemed so attractive that men who have not been directly connected with operations in malleable cast iron have been induced to invest. In the *Tradesman* Mr. E. H. Putnam writes in a vein calculated to encourage the latter class to launch out. In general Mr. Putnam has taken the position that the importance of the chemist as a factor in foundry operations has been exaggerated of late, and he consistently minifies the necessity of a chemist, in what he says about malleable undertakings. We believe, however, that malleable manufacturers do not hesitate to acknowledge their indebtedness to chemistry for much of the advance of recent years. It is not so important whether they credit the result to a chemist actively overseeing their work or to a foundry manager who though trained in the old school, has yet been progressive enough to absorb much of the material that chemical investigation has been putting at the disposal of the up-to-date foundry superintendent and foreman in the past five years. Mr. Putnam says:

"There has been going the rounds of the trade journals press a good deal of literature concerning the manufacture of malleable iron that is calculated to mislead foundrymen who are not familiar with the business. Not that the writers have intended to mislead. It is rather a case of erroneous judgment in this instance. I am here referring to the claim often made during the last two years, that in order to succeed in the manufacture of malleable iron it is highly important that a chemist be employed at the plant, among whose duties should be that of analyzing the irons to be used. Now, I have never denied that, in some foundries, it would be expedient to employ a chemist and have been much inclined to concede the general application of the argument in relation to the making of malleables. But, a visit to a number of important malleable iron manufactories, without finding a chemist at a single one of them, rather knocks the underpinning from the argument for the chemist even in this line of founding. It has always seemed to me, and I have always said, that the place for the chemist is at the blast furnace, where the iron is made. When I go to the drug store and ask for a quart of silicate of soda, I get a quart of silicate of soda; I know it, not by making a chemical analysis, but because I have the (implied) assurance of a chemist who is employed at the manufactory that it is silicate of soda. It is now pretty generally the same way, and will soon be universally so, in the case of pig iron. Nevertheless, at the present time, there are many large manufactories engaged in lines of product where the employment of a chemist is, no doubt, a measure of economy, and insures a more satisfactory product than could otherwise be gotten. But this concession does not apply to general founding. In short, if you are engaged in the manufacture of agricultural machinery and wish to make your own malleable you can do so with perfect success without employing a chemist. What you want is simply a manager who is thoroughly posted in the manufacture of malleable iron. He will select his mixtures from the analysis furnished by the blast furnace chemist, and he will make you as good malleable as you are buying to-day.

"But do not go into the manufacture of malleable iron unless you use at least 300 tons of castings a year. And even with this tonnage of consumption it is a question as to whether it might not be more economical in the long run to buy the castings. If, however, the intention were to expand into a large business the fact that you are able to use a few hundred tons per year in your own work would constitute a condition greatly in your favor.

"The wonderful growth of the malleable iron industry of recent years marks it as a business that should engage the attention of founders in all sections where the conditions are favorable to its prosecution. There is absolutely no secret connected with its manufacture. It is a simple process, perfectly easy—if you know how! Anybody can buy the iron from the blast furnaces, such as malleable iron makers use; mix this so that when melted and hot enough to pour, it will produce a casting in which all the carbon is combined with the iron; that is, so that the fracture will be white. Pack the castings with rusted rolling mill scale (oxidized by treatment with solution of sal ammoniac) in hard iron pots, and, placing them in the annealing oven, maintain a degree of heat the color of light orange for a period of four or five days, and if the heat has been pretty uniform throughout the oven your product will be all right. However, though the processes are simple and easy of practice when once you become familiar with them, yet it would be a great and expensive business without the assistance of a number of men thoroughly experienced in the business. The things that, above all others, the manager ought to know all about, are: (1) Pattern making and gating; (2) founding; (3) annealing; leaving analytical chemistry entirely out of the category, relying on the blast furnace analysis.

"If you are going to produce for your own use solely, and your castings are to be on the light order, or if you do not require the highest grade of castings as regards strength and ductility, the cupola will answer very well for the melting, and it is more economical for a limited product, and more easily and cheaply managed. But if you are going to manufacture for the general market you had better start out with the reverberatory furnace at once, else you will have to refuse many of the best paying jobs as the cupola product would be unsatisfactory."

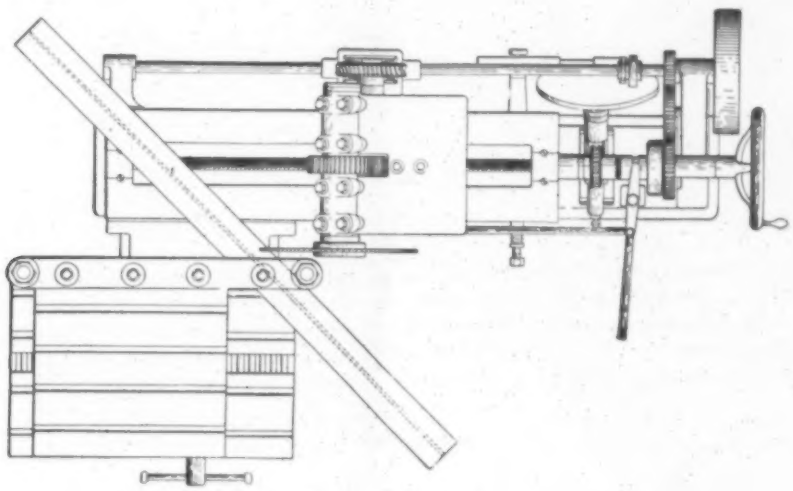


FIG. 2.

The H. F. De Bardeleben syndicate of Cedartown, Ga., has purchased several thousand acres of mineral lands near Cave Springs, Ga., and the work of developing will soon begin. Two large iron ore washers, with steam shovels and all modern appliances for ore mining on a large scale will be erected at the richest deposits.

STOCK DISTRIBUTION AT LORAIN FURNACES.

The practical operation of the distributing apparatus provided for the new furnaces of the Lorain Steel Co., at Lorain, O., has quite fulfilled the expectation of the management. Reference was made to the proposed device for this work in the preliminary description of these furnaces which appeared n our issue of July 7, 1898. Theoretically the apparatus appeared excellently adapted to secure even distribution of the various blast furnace charges. That this is the actual result attained has been practically demonstrated and is shown in the plotted lines in the illustrations we give. While Furnace No 1 was being filled, prior to starting, a series of measurements was taken, and from the data thus obtained the stock lines were projected as indicated. Fig. 1 gives the ore lines, as established along diameters running in the directions given; and their close approach to uniformity is proof of the very satisfactory operation of the apparatus. The lines of the coke charges as they appear in Fig. 2 show steeper angles, owing to the different character of the material, but the approximation of the lines is close, as with the ore.

In connection with the diagrams some description of the top filling and distributing apparatus will be of interest. A sectional view is given in Fig. 3. The top is closed by means of the usual bell and furnace hopper. A conical seal, made in six sections, is bolted to the top of the furnace hopper. It is provided with six 18x24-inch explosion doors, and having lugs with holes for the suspension rods. This seal prevents the escape of furnace gases when the bell is lowered for the purpose of allowing the charge to pass into the furnace, and the explosion doors provide for relief in case of emergency The sections of the seal are bolted together and may be easily and quickly removed for renewal of the bell or hopper rings. Above the seal, carried by a truck traveling on girders supported by columns, from the furnace platform, is the distributing apparatus. The distributor consists of a hopper o sufficient capacity to hold the several maximum charges of coke, ore and limestone. The hopper is cylindrical, with flared top and built in two sections, one suspended from the beams of the truck, and carrying the bell, while the other section, a little larger in diameter, is arranged to rest on the top flange of the furnace seal, when stock is received from the skip.

This outside ring is lifted by a steam cylinder on the truck

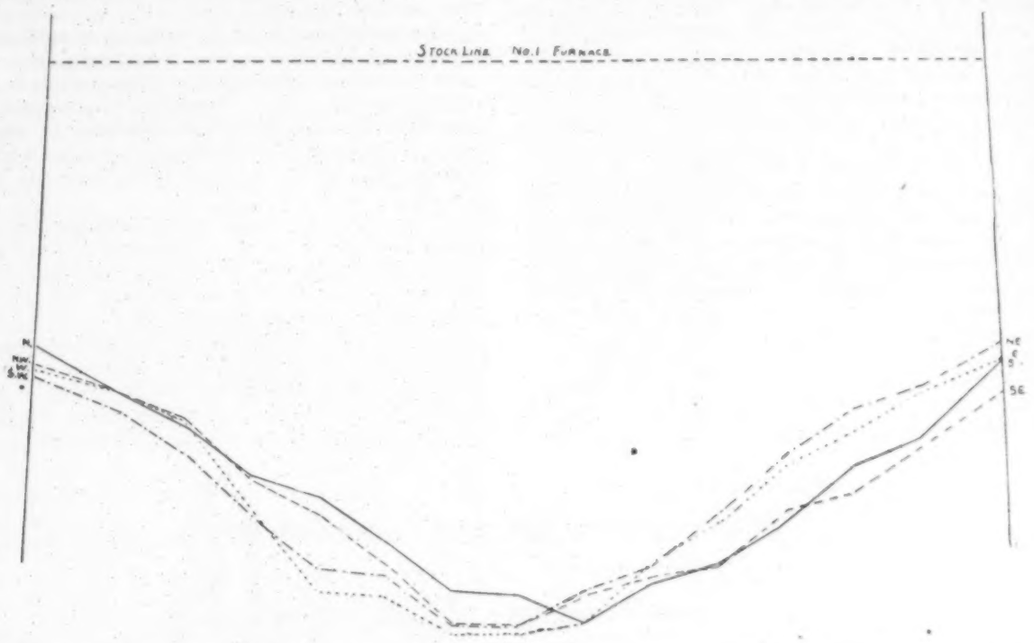


FIG. 1.—ORE PROFILE, FURNACE NO. 1, LORAIN STEEL CO., SHOWING RESULTS ATTAINED BY DISTRIBUTING APPARATUS.

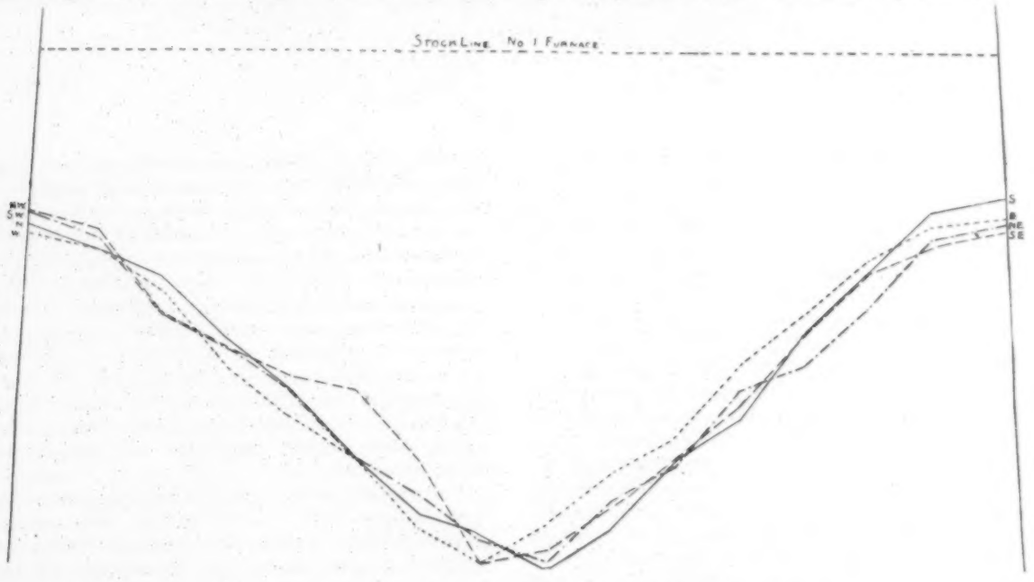


FIG. 2.—COKE PROFILE ,FURNACE NO. 1, LORAIN STEEL CO.

through lever and chain connections. The lifting of the ring allows the stock to drop from the hopper bell, which is suspended from the inner ring, to the furnace bell. The hopper bell being stationary insures equal space for the outlet of stock, and therefore even distribution. Ample clearance is allowed between the outer and inner rings of the distributor hopper, to insure free vertical motion. A ring, made in sections and provided with slotted holes, rests on the outer ring and permits adjustment, to conform to any irregularity or change of shape of either ring of the hopper, or any possible variation in the alignment of the track girders. This ring closes the space between the hopper rings and acts as guide when the outer ring is lifted.

THE USES OF ALUMINUM.

The principal uses of aluminum are too many to be enumerated. The properties of the metal are so akin to those of copper and brass that, broadly speaking, aluminum or one of its light alloys, should to a large extent replace both copper and tin and also nickel or German silver. Such a change would be followed by various advantages to all concerned. Not only would there be a considerable reduction in the weight of the articles, but they would not tarnish or turn black on exposure to air. The cost should be the same, if not actually lower, inasmuch as, bulk for bulk, aluminum is already cheaper than copper or tin; and its price will continue to fall as the demand increases. One field, however, remains which copper is bound to maintain as its own, namely, the construction of isolated electrical conductors. Experiments have already been made on a large scale with bare conductors of aluminum for telephones, with perfectly satisfactory results, its conductivity, weight for weight, being double that of copper. But when the mains have to be insulated, copper is absolutely unapproachable, on account of its greater conductivity, volume for volume, which is 165 per cent of that of aluminum.

Besides the advantages set forth above, aluminum is not poisonous, and is pre-eminently adapted for the manufacture of cooking utensils. A steady demand for aluminum is springing up in various kinds of printing processes, as well as in lithography. The metal appears to answer admirably for the construction of rollers used in calico printing; and when its surface is properly prepared, it is also capable of replacing the ordinary lithographic stone. It can easily be imagined that, instead of having cumbrous and heavy stones, which can be printed only on special slow-running "litho" machines, it is far better and cheaper to use thin sheets of ametal which can be bent into a circular form and printed on rotary presses.

Bicycles, electric light fittings, chains, bridles, stirrups, surgical instruments, sextants, and other scientific apparatus, keys, cigar cases, pen and pencil holders, toilet articles, plates and dishes, spoons, forks, frames, name plates, door furniture, hat and coat pegs, boot-trees, fire engine fittings, business and visiting cards, and photographic cameras, are a few of the things that are being daily made in aluminum by various firms.

For motor cars there should be a large field for aluminum. A further demand for the metal will be brought about by its introduction into the military services. All parts of the soldier's equipment have practically been made already in aluminum, such as mess tins, water bottles, buttons, helmets, parts of rifles, cartridge cases, fittings for guns, tents, horseshoes, portable bridges, etc., and it is well known that continental armies, notably the German army, are employing aluminum on a large scale.—[E. Ristori, in Cassier's Magazine for October.

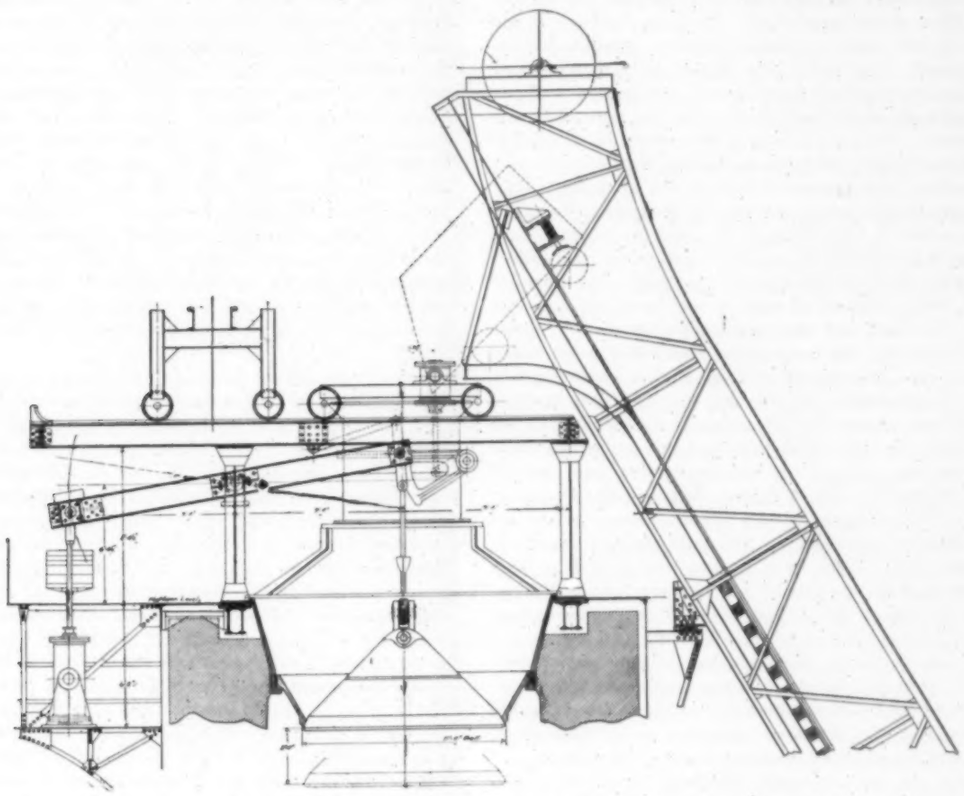


FIG. 3.—SECTION OF TOP OF NO. 1 FURNACE, LORAIN STEEL CO., SHOWING DISTRIBUTING APPARATUS, HOPPER, BELL, ETC.

THE Engineers' Society of Western Pennsylvania held its regular monthly meeting at headquarters in Pittsburg, Tuesday evening last. The principal business was the reception and discussion of the report of the Power committee, which has been at work for some months. Henry W. Fischer is chairman of the committee. There was some further talk on the smoke question. The following named gentlemen were elected to membership: Edwin E. Arnold, M. E Westinghouse Machine Co., East Pittsburg; Lawrence L. Arnold, chemist, Jones & Laughlins, Ltd., Pittsburg; Cyrus Robinson, Corliss engine department, Westinghouse Machine Co.; E. W. Hess, engineering department, Pennsylvania Lines West of Pittsburg; Robert S. Orr, principal Ninth Ward School, Allegheny, and Edmund Yardley, statistician, Pennsylvania Lines West of Pittsburg. The chemical section of the society meets Thursday night.

HOISTING ENGINE DEVELOPMENT.

Few of the American people—none, in fact, except those who have been there—have any adequate idea of the magnificent display of machinery to be seen in the iron and copper mining regions of Northern Michigan. Were the sights to be seen in that section generally known, it would become a resort for sightseers from all portions of the country. Engineers and mechanics especially would not consider that they had done their duty by themselves until they had feasted their eyes on the great works in steel and iron which there abound. Nowhere else on this continent is there anything so impressive, while the machinery exhibit at the World's Fair at Chicago was tame in comparison. These are large statements, but will scarcely be disputed by any one who has been there.

The great hoisting engine of the Tamarack Mining Co. suggests a few reflections on the development of hoisting engines in the Lake Superior region, than which there are few more interesting topics.

In the early days of mining in any section, the hoisting-engine problem is a simple one; and, indeed, so far as metal mining is concerned, the problem never became a large one until the advent of the power drill. In those days it was not a question of how much material could be hoisted, but of how much could be mined. The depths to be hoisted from were shallow, the output by hand drilling was limited, and the small geared hoist amply sufficed to clear the mine of all the material mined. With the advent of the power drill the quantity mined increased, and with increasing depths, increased speed of hoisting was necessary to hoist old amounts. This increased speed necessitated abandoning the gearing between the engine and the rope drum shafts, and the direct or first motion hoist with the engine cranks keyed to the drum shaft came in. The effect of this was far-reaching. The speed of the engine being reduced to that of the drum, its size was necessarily increased, and since the change was made in order to do faster hoisting, the horse-power required was increased at the same time. As depths increased, this condition was intensified, and gradually the power required, which before had been insigificant, became a considerable factor in the total cost of mining. In the effort to reduce this and at the same time increase the output, the balanced hoist appeared, in which the descending empty bucket balanced the weight of its ascending loaded mate, leaving the ore alone as the net load to be hoisted by the engine, and at the same time nearly doubling the output of the hoist by avoiding the loss of time in lowering the skip for a new load. This form of hoist, however, required larger shafts for the two skip ways, and on account of this, in the early days of balanced hoists, the balancing was in some cases effected by a balance bob or dead weight running down a separate and otherwise abandoned shaft. The results obtained from such makeshift outfits as this furnished the evidence necessary to convince many mining men of the superior economy of balanced hoists.

Meanwhile the inclined shaft following the ore vein, with its "skip" or bucket running on a track, which always prevails in the early days of mining in any section, was being abandoned for the vertical shaft with its cage and separate car—the "cage," as some of our readers may need to be informed, being essentially a warehouse elevator. Many reasons led to this change, chief of which was the ever-present necessity for increasing the output. With the inclined shaft and its skip attached to the rope, the engine must stand still while the skip is being loaded; while with the cage and separate car the engine need be idle long enough only to push off the empty car and push on the full one. In addition to this, the cage hoisted vertically and fitted with guides embracing the guide rails, may clearly be hoisted safely at a speed far in excess of what is practicable with a skip with wheels running on an inclined track. The change, however, reacted on the engine, partly by reason of the increased power required by the increased speed, and partly because the cage construction increased the non-paying load. The increase of non-paying load had no effect on the power required, since the cages balance each other, no matter what their weight may be, but it added to the difficulty of securing a perfect balance through the increased size of rope involved, and this came at a time when the weight of the rope was already becoming a complicating factor in the balancing. It will be observed that, with the load at the bottom of the shaft, the weight of the rope is added to that of the load at the end of it, while with the load at the surface, the rope disappears as part of the load to be hoisted. Hence with cylindrical drums, cages which are balanced when both are half-way down the shaft, are not balanced at any other point. The larger the rope the more pronounced this action, since, whatever its size, it all acts as weight to be hoisted when run out, and all disappears when run in. Hence the adoption of the cage, by adding to the size of the rope, intensified the difficulty of perfect balancing.

This point of the weight of the rope is of more importance than would be supposed by any one who has not given attention to it. With the Tamarack Mining Co. hoist, the weight of one rope is 21,800 pounds, while the total load, including the rope, is but 42,000—the rope being thus more than half the total. With a loaded cage starting from the bottom, the pull on that side would be 42,000 pounds, while the balancing load of cage and empty cars—the light cage being at the surface with the rope wound on the drum—would be but 8,200 pounds, giving a net load to be hoisted of 33,800 pounds. With the loaded cage at the surface these conditions are reversed, the load on that side being but 20,200, while the load on the "light" side has had the weight of the rope added to it and becomes 30,000 pounds, which is much the greater of the two. In other words, starting with the loaded cage at the bottom of the shaft, and with a net load to be hoisted of 33 800 pounds, this gradually lessens as the load rises, eventually disappearing and being finally succeeded by a reversal of the conditions, the empty cage and rope doing the work and the landing being effected by the brake. This condition of things is highly dangerous and altogether intolerable, and to meet it the conical drum was introduced, in which the rope, when fully wound up, acts on the large radius of the drum, and when paid out on the small radius—the variation in leverage counteracting the variation in weight of the rope hanging from the drum.

Another device for meeting this difficulty is the flat rope of tapering section and wound upon a reel instead of a drum. The tapering section reduces the weight of the rope, and the rope winding on itself gives to the reel an action similar to that of the conical drum. The flat rope, however, has never been looked upon with favor in the Lake Superior region, the chief reason being that, unlike the straight rope, it cannot be reversed to equalize wear. Moreover, the arrangement is inflexible at best, as the large and small diameters of the reel are determined by the thickness and number of wraps of the rope, and may not be such as to suit other requirements.

During all this development, the size of the engines was being constantly increased and the problem of handling them became a serious one. Hoisting engines, of all engines in the world, must be under absolute and easy control. They must be started, stopped and reversed with the utmost ease and precision. With the growth in the size of the engines until the mere brake shoes, for example, came to weigh tons, with other tons of pressure necessary to make them hold their engines, manual power became entirely inadequate to manage them, and steam cylinders controlled by hand operated valves were introduced to operate the brakes, the reversing gear, and finally, in this instance, even the throttle valve.

Meanwhile the constantly increasing speed of hoisting—reaching in the present instance three-fourths of a mile a minute—had added to the dangers of overwinding. Although indicator gears for showing the exact position of the load at all times were long ago added, they are not a sure preventive of accidents from this cause. Through disarrangement of the indicator gear or loss of control at critical moments, cases have arisen in which the loaded skip or cage has been shot through the top of the shaft-house, with widespread ruin and loss of life as the result. This has even happened when loads of miners were being hoisted to the surface and with appalling results. These dangers have rendered necessary the addition of safety stops, whereby the engine shuts off its own steam and applies its own brakes in case of failure to do so by the attendant. In the Tamarack hoist an additional safety feature has been introduced whereby the brakes are normally set, the action of the operator being to release rather than to apply them, as in common practice. The result is that with steam down and the engine room deserted, the engine is

locked in position and cannot be turned over until steam is raised and the brakes released.

These explanations will serve to show the reasons for the highly organized character of the modern mine hoist, of which this machine is a splendid example. The fact is, there is no department of engineering which has called for a higher degree of talent, either from the standpoint of design proper or of ingenuity of invention, than that of mine hoisting machinery, and those whose field of work is far removed from that of this class, and who too frequently regard mining machinery as of a rough-and-ready character only, ought to acquire added respect for it and for those who devote themselves to it, from this example of Mr. Nordberg's work.—[American Machinist.

OUTPUT OF BLAST FURNACES OF UNITED STATES.*

October 1, 1899.

Location of Furnaces.	Coke and Anthracite.					Charcoal.				
	Total No. of Stacks.	In Blast.		Out of Blast.		Total No. of Stacks.	In Blast.		Out of Blast.	
		Number.	Weekly capacity.	Number.	Weekly capacity.		Number.	Weekly capacity	Number.	Weekly capacity.
New York	13	6	6759	7	3650	2	2	230	0	0
New Jersey	5	4	2684	1	600	.....	.....	.....	.....	.....
Spiegel	2	2	279	0	0	.....	.....	.....	.....	.....
Pennsylvania:						13	2	108	11	550
Lehigh Valley	28	20	9731	8	2930	.....	.....	.....	.....	.....
Spiegel	1	1	100	0	0	.....	.....	.....	.....	.....
Schuylkill Valley	14	12	8812	2	1339	.....	.....	.....	.....	.....
Upper Susqu. Val.	5	4	3491	1	600	.....	.....	.....	.....	.....
Lower Susqu. Val.	10	8	5732	2	500	.....	.....	.....	.....	.....
Lebanon Valley	12	11	6948	1	534	.....	.....	.....	.....	.....
Spiegel				0	0	.....	.....	.....	.....	.....
Pittsburgh	28	28	5995	0	0	.....	.....	.....	.....	.....
Spiegel	2	2	2455	0	0	.....	.....	.....	.....	.....
Shenango Valley	15	14	19541	1	935	.....	.....	.....	.....	.....
Western Pennsylvania	20	12	14558	8	5234	.....	.....	.....	.....	.....
Spiegel	1	0	0	1	700	.....	.....	.....	.....	.....
Maryland	5	3	4215	2	1450	4	0	0	4	569
Wheeling District	10	10	12260	0	0	.....	.....	.....	.....	.....
Ohio:						8	3	206	5	310
Mahoning Valley	13	12	19486	1	690	.....	.....	.....	.....	.....
Central & Northern	11	9	16649	2	1850	.....	.....	.....	.....	.....
Hocking Valley	11	9	4818	2	460	.....	.....	.....	.....	.....
Hanging Rock	2	2	703	0	0	.....	.....	.....	.....	.....
Illinois	16	15	27499	1	900	.....	.....	.....	.....	.....
Spiegel	1	1	837	0	0	.....	.....	.....	.....	.....
Minnesota	1	0	0	1	629	.....	.....	.....	.....	.....
Wisconsin	4	4	3304	0	0	.....	.....	.....	.....	.....
Missouri	2	0	0	2	1550	.....	.....	.....	.....	.....
Colorado	3	2	2140	1	800	.....	.....	.....	.....	.....
Virginia	21	12	8141	9	5934	4	1	45	3	290
Kentucky	5	5	2245	0	0	3	0	0	3	200
Alabama	33	21	21008	12	11540	7	3	1139	4	600
Mich., Mo. and Wis.	.....	.....	.....	.....	.....	15	6	2890	9	3158
Tennessee	13	11	7910	2	950	5	3	774	2	410
Georgia	2	0	0	2	960	3	1	420	2	300
North Carolina	2	1	238	1	400	.....	.....	.....	.....	.....
New England	.....	.....	.....	.....	.....	11	3	245	8	730
Texas	.....	.....	.....	.....	.....	4	1	175	3	750
Utah	.....	.....	.....	.....	.....	1	0	0	1	175
Oregon	.....	.....	.....	.....	.....	1	0	0	1	275
Totals	311	241	272428	70	45135	81	25	6222	56	8317

SUMMARY.

Fuel.	In Blast.						Out of Blast.			
	Number.			Weekly Capacity.			Number.		Weekly Capacity.	
		Month Previous.	Year Previous.		Month Previous.	Year Previous.		Month Previous.		Month Previous.
Charcoal	25	24	20	6,222	5.665	5.732	56	57	8,317	9.493
Coke and Anthracite	241	233	172	272,428	261,670	209,903	70	82	45.135	51,652
Total	266	257	192	278,650	267,335	215,635	126	139	53 452	61,145

*Condensed from the *Iron Age*.

The Riter-Conley Mfg. Co., Pittsburg, has blast furnace work in hand which will keep it so busy that no new work in this line can be undertaken to be commenced within a year. It is building the four furnaces for the Dominion Iron & Steel Co., Sydney, N. B., which will have a capacity of between 500 and 600 tons a day; One furnace for Laughlin & Co., Ltd., Pittsburg, (to be known as Eliza No. 4), 105 feet by 22 feet, and two furnaces for the American Steel & Wire Co., one adjoining the Central Furnaces in Cleveland and the other adjoining the Edith Furnace in Allegheny. These two will be completed within six months. Besides this it will build the two furnaces at Rankin, for the Carnegie Steel Co., and entirely rebuild Eliza furnaces Nos. 1 and 3, for Laughlin & Co., Ltd.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market, and Some of Their Wants:—

The Wisconsin Machinery Co., Milwaukee, Wis., is in the market for a stone crusher, (Gates of larger size than No. 2 or other make).

The Vulcan Western Co., Streator, Ill., is in the market for an 80 h. p. Corliss engine, 800 h. p. hot well and pump, 34 to 40-inch centrifugal extractor, hand punch, shears, and hand drill, 100 feet of 2-inch shafting, 30 feet 2⅞-inch shafting, all second hand in good order.

The Dimmick Pipe Co., Anniston, Ala., has made a schedule of some of its expected purchases of equipment as follows: One circular rip saw, iron frame, adjustable; one band saw, 42-inch wheels; one 20-inch jointing planer; one automatic knife grinder; one medium size 30-inch surface planer; one 30-inch swing patternmaker's turning lathe; one large column face lathe; one No. 7 patternmaker's lathe, iron bed, double face plate, movable carriage, rest and tool post, floor stand, etc.; one radial drill 5-foot arm; one small lathe, 16-foot swing, 8 feet between centers; one planer, 54x54-inch by 14-foot bed; one boring mill, 72 inches, portable; one shaper, 16-inch stroke; one bolt cutter; one emery wheel grinder; one lathe, 48-inch swing, 16 inches between centers; one drill press, 18 inches; one drill press, 12 inches; one lathe, 36 inch swing, 18 inches between centers; new and second hand.

A charter has been issued to the Norristown (Pa.) Iron Co., capital $200,000.

The Manhattan Rolling Mill, of New York, has been incorporated with a capital of $2,000.

The New York Shipbuilding Co. has been incorporated with a capital of $3,000,000, and work has begun on its plant at Camden, N. J.

New Construction:—

The Western Electric Co., Chicago, has commenced work on two new buildings for the enlargement of its plant. They will be on the northeast corner of Jefferson and Harrison sts. One building will be 51x170 feet and the other 46½x100 feet in size. Both buildings will be occupied as an iron foundry, the plant containing two cupolas, one of 10 and the other of 7 tons capacity. A 20-ton traveling crane will cover the floor space. Adjoining this building the company will erect a machine shop, 51x170 feet in size. With the erection of these additions the company will cover 85 per cent of the entire block bounded by Van Buren, Clinton, Harrison and Jefferson sts. Plans have been prepared also for the erection of still another building, to occupy the space now used by the Pitkin Paint Co.'s plant, 55x151 feet in size and nine stories high. The main floor of this building will be used for heavy dynamo machinery and the balance for insulating work. It is understood that part of the foundry plant now being erected will be used in the manufacture of malleable castings.

The Excelsior foundry located at Bay City, Mich., has been rebuilt and is now under operation. The plant was destroyed by fire some time ago.

The addition to the Falcon Bronze Co.'s plant at Youngstown, O., is nearing completion.

Work has begun on an addition to the machine shop of the Youngstown Foundry & Machine Co., Youngston, O.

The Alan Wood Iron Co., Conshohocken, Pa., has begun work on an addition, which will include a 96-inch plate mill. New furnaces and other equipment will be put in; estimated cost $50,000.

The Monessen Foundry & Machine Co., at Monessen, whose plant was destroyed by fire some few months ago, is rapidly getting its new works constructed. The foundry, which is 60x100 feet, will be ready in about 10 days while the machine shop will be rushed as fast as possible. All the buildings are of frame. Nearly all the machinery is on the ground ready for installation. Special attention will be paid to castings for furnaces and rolling mill work.

The Pittsburg Machine Tool Co., organized in Pittsburg last April with a capital stock of $250,000, has purchased from the Gleason Tool Co., Rochester, N. Y., its patterns for lathes and planers, and has removed these to the new shops,

at Darrah and Lacock sts., Allegheny, Pa. The main building occupied by the Pittsburg Machine Tool Co. is of brick and iron. The equipment consists of the latest designs of lathes, planers and other heavy iron working tools. The company manufactures lathes and planers of specially heavy design. Frank Moore, of the Pittsburg Malleable Iron Co. is president, and F. J. Curtis, formerly mechanical engineer of the McConway & Torley Co., is secretary and general manager. The company already has a large number of orders.

The Strawbridge-Wright Mfg. Co., St. Louis, is increasing its operations. It has been doing a general experimental machinery and pattern business, and with additional capital will develop other departments. The new officers are Dwight Tredway, president; David Strawbridge, vice president; and L. A. Brown, secretary and manager. The additions proposed are a gray iron foundry, brass foundry and nickel plating department.

Work on the plant of the new Scullin-Gallagher Iron & Steel Co., at St. Louis, has begun. The company will manufacture cog wheels, trucks bolsters, gearing and general railway castings and other special products under patents. The plant will have five open-hearth steel furnaces, and six modern gas producers 10½x12. The finishing department will be 75 feet. The foundry and furnace departments will be respectively 75 and 65 feet wide and 300 feet long, and under one roof. The entire plant is to be run by electricity, a 250-kilowatt generator of the Western Electric type having been contracted for.

The Marion, (O.) Malleable Iron Co. is pressing work on its new addition and will have it completed in the next two months.

Northern Engineering Works, Detroit, Mich., crane manufacturers, are making an addition to the plant recently purchased by them. The interior arrangement of the machine shop and office is also being remodeled with a view to enlarging the capacity of the plant.

The Gisholt Machine Co., Madison, Wis., will erect a new foundry, of brick with steel roof, 100x160 feet in size.

The American Shovel Co., New Castle, Ind., will build four brick and stone buildings, 60x80, 40x80, 40x40, and 120x20 feet in size. The buildings will have slate roofs. The company will buy steel and iron work and machinery for making shovels, in connection with this plant.

Pawling & Harnischfeger, crane manufacturers at Milwaukee Wis., will erect a new power house to cost $6,000. The building will be of steel with brick and stone walls, 50x50 feet in size, one story high.

The Cole Mfg. Co., Chicago, will erect a new foundry at Western and Brass aves. The building will be of brick, 154x180 feet in size.

When the Union Malleable Iron Co. occupies its new plant at East Moline, Ill., it will branch into a general foundry business.

The Detroit Stove Works are about to erect a foundry 150x126 feet and 27 feet high.

Schaun & Uhlinger, of Philadelphia, Pa., are erecting a new foundry 54x152 feet.

A company has recently been organized which will operate the Huron Machine Works at Port Huron, Mich. The company will erect a building and expects to be in operation by Nov. 1.

Chicago District and Northwest:—

The Chicago Rawhide Mfg. Co. reports that it has been having a large trade in the last few months, and that its business has nearly doubled in the last year. The company's Rawhide pinion and blank business is at least three times what it was a year ago. One explanation may be that it has been changing its machinery and is making a better pinion than ever. The foreign trade does not show as heavy gains as sales in this country, but there are some excellent orders from abroad.

It is stated that the Western Electric Co., of Chicago, will make additions to its plant to the amount of $175,000. A malleable iron foundry will be erected.

Heggie Brothers, of Joliet, Ill., have well under way the construction of their new boiler plant. The building will be 175x80 feet, with a steel roof. A traveling crane will traverse the entire building. The structure will cost about $15,000, and $25,000 additional to fit up. The company has a large number of orders already on hand.

The Chicago Pneumatic Tool Co. has increased its capital from $60,000 to $75,000.

The Garden City Sand Co., Security Bldg., Chicago, finds the statement general in its trade that business is 100 per cent greater than it was a year ago. The only trouble of this company is to obtain sufficient supply to take care of its orders, notwithstanding the doubling of sales It recently made shipments to Russia, Cuba, Mexico, Californua and is now figuring on a supply of material for the Philippines. The general manufacturing and foundry business is exceedingly good, as orders in this line are very numerous and of good size. The Garden City Sand Co. has a great demand for its dome fire clay, having disposed of over 50 carloads to one manufactuer since Jan. 1. It has displaced high-priced Pennsylvania clay in many instances. The company has recently increased its fire sand supply department very materially and is now able to take care of orders of any size. In a general way the company states that it has nothing to ask for in the matter of business. It is simply selling everything it can get.

The Simplex Railway Appliance Co., of Hammond, Ind., with general offices in the Fisher Building, Chicago, report an increase of about 200 per cent over last year, and the capacity of the works is constantly being enlarged. The company was organized in August, 1897, and now employs 150 men. The steel car truck bolsters manufactured by the company are rapidly gaining in favor and are now in use on 40 different railroads. The "Simplex" bolsters are made of medium open-hearth rolled steel channels and plates, and malleable iron castings. They are made in such a way that there strength does not in any direction depend upon rivets or bolts, and the metal is so disposed as to give the greatest possible strength for a given weight. They are also easily adapted to any style of car or truck.

The Marinette Iron Works Mfg. Co., founder, machinist and mill furnisher, Marinette, Wis., was recently organized and incorporated under the laws of Wisconsin with a capital stock of $75,000, with the following officers elected: T. C. Miller, president; S. P. Colby, vice-president; H. L. Prescott, secretary; H. H. Norris, treasurer. In addition to the manufacturing of the Walrath gas engines and wagon skeins, the company is carrying on a general foundry and machine business, particularly building saw mill and mining machinery.

The Sall Mountain Asbestos Co. has been incorporated at Chicago, with capital stock of $10,000, for manufacturing and dealing in asbestos and fire-proofing, by Clarence E. Cook, Laura D. Benjamin and Cecil M. Clarke.

The Chicago Malleable Castings Co., whose main office is at 1110 Chamber of Commerce Building, Chicago, is rapidly installing the equipment of its new plant at West Pullman, Ill., and expects to take off the first heat in the latter part of the month. The plant is complete in every particular, and every approved appliance in malleable practice will be provided. The buildings will be of brick and steel, three being 72x275 feet each, and the annealing room 206x300 feet. Two 10-ton reverberatory furnaces are provided, and a cupola for hard castings. The daily melting capacity will be 60 tons on malleable work. All machinery will be electrically driven from a central plant in the power house, from which light and power will be furnished. The arrangements for handling materials are most economical and complete. At the start 300 men will be employed and this force will be increased.

The Polish Publishing Co., publishing the *Polish Daily News*, which has a large circulation in Chicago, has recently put in a 25 h. p. Backus gas engine, sold it by the Chicago Water Motor & Fan Co. The company required about double the power to drive additional machinery over what its old 10 h. p. gas engine of another make had been driving.

The Pittsburg District:—

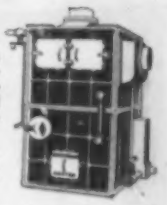
The Pittsburg Valve & Machine Co. has taken a building permit for a frame iron-clad machine shop, to cost $7,000.

The Pittsburg Steel Foundry announces that its plant at Glassport, Pa., is nearing completion, and it is expected to take the first heat out on Oct. 20. The foundry will contain all the latest equipment, and with five 20-ton open-hearth furnaces, will be able to pour the largest castings that may be

Can You Lift Yourself By Your Boot Straps?

NOT AT ALL!

Your live steam injector may be putting water into your boilers at a temperature of 150° F. Do you therefore think that the only saving you could make by increasing the temperature would be the difference between water at 150° and water at 210°, or say 6% of a saving. Not at all. As far as coal saving is concerned, you are actually feeding cold water at the temperature of the initial supply which may only be 30°, or 40°, or an average of 50° all the year round. A **COCHRANE HEATER** with just enough exhaust steam to do the work (generally one seventh of all the steam the boilers are making) **will save, in the average plant, 16% of all the coal used while that injector was being operated,** regardless of the temperature of the water delivered by the injector.



The heat the injector put into the water came from the boiler. The pull you put on your boot straps comes from within yourself. Think this over—write us, and we will tell you how to apply the force at the proper point that will lift you out of a rut.

HARRISON SAFETY BOILER WORKS, Clearfield & 17th Sts., PHILADELPHIA PA

required. The plant is very roomy and was designed for most economical handling. The management is vested in President Stewart Johnston, formerly general superintendent of the American Steel Casting Co., and Secretary-Treasurer Augustus Trump, formerly manager of the steel casting department of the Otis Steel Co., Ltd. The heads of the various departments are men of long experience in their particular lines. The principal office is in German National Bank Building, Pittsburg.

The Union Boiler Tube Cleaner Co., of 231 Penn Avenue, Pittsburg, has recently finished the largest contract ever awarded for cleaning boilers. It was for 22 water tube boilers, containing an aggregate of 10 miles of 4-inch tubes The company has just shipped the eighth machine to England and Scotland. The initial machine for export had been shipped just one year previously. One machine of the last shipment was a repetition of the first order.

A new concern, the Fox Copper, Bronze & Brass Works, will erect a $50,000 plant on Smallman st.

The Westinghouse Machine Co. has taken enough orders for great mill engines to keep its Corliss engine department busy for three years. The new foundry will not be completed before Feb. 1. The orders on hand amount to $4,000,000.

James Bonar & Co., 1216 Carnegie Bldg, Pittsburg, have just shipped one of their Pittsburg feed water heaters to be used in the installation of the United States Goverment ice plant being erected by the York Mfg. Co., York, Pa., in the newly acquired possession of the Island of Guam. This is doubtless some of the first, if not the first, business Pittsburg has had from this new territory.

The Westmoreland Steel & Mfg. Co., Pittsburg, has been chartered in West Virginia, with $2,500 capital stock, with the privilege of increasing this to $250,000. The incorporators are C. S. Knight, Jr., C. S. Cook, and J. D. Sutherland, of Pittsburg, and W. S. Wright and H. S. Sands of Wheeling.

Jones & Laughlins, Ltd., Pittsburg, are continuing their policy of extension and improvement. It has been practically decided to add a third Bessemer converter, of 15 tons capacity, in the near future. As soon as the short cessation of operations is permissable the present 10-ton converters will be enlarged to the same size. The soaking pit capacity is being considerably increased at the present time by which a greater output will be possible form the present converting equipment. The two new continuous bar mills will be completed and in operation next year, and even with the increased converting capacity the firm will probably be able to finish all its steel, and will not sell any Bessemer billets or slabs, although some open-hearth material will probably be disposed of in this form.

Laughlin & Co., Ltd., Pittsburg, will shortly begin the work of entirely rebuilding Eliza furnace No. 1. This work will take about four months, and will be followed by the rebuilding in the same way of No. 3. No. 2 was recently rebuilt. The new furnace, which will be designated No. 4, will be completed by the end of the year. Eliza furnace No. 2 is now the largest blast furnace in the World, being 105 feet high by 22 feet diameter at the bosh.

General Industrial Notes:—

The Ferracute Machine Co., of Bridgeton, N. J., has just received a $10,000 order from a Western firm for presses. The company has enough orders on hand to keep its plant in operation night and day for six months.

The Atchison road has awarded to the Baldwin Locomotive Works contract for 55 consolidated locomotives, and has ordered 20 moguls from the Richmond Locomotive Works.

The Sharon (Pa.) Iron & Brass Foundry turned out the largest gas valve ever made there—a 30-inch valve for the Republic Iron & Steel Co.

Nearly all the furnaces in the Birmingham, Ala., district are in full operation. The Tennessee Coal, Iron & Railroad Co. have twelve in blast and another will soon be ready. The Sloss Iron & Steel Co. have four furnaces in operation.

The Southern Leaders.

PIG IRON.

The extreme depression in pig iron forced several favorite brands out of the market because furnace owners could not pay prices demanded for their choice supply of ore and coke.

The present revival enables them to operate again and it is a pleasure to offer

TALLADEGA, TRUSSVILLE, VANDERBILT, WILLIAMSON.

The plants are not large and the combined production will not cut much figure in the year's output. Each one, however, will be run under the close personal care of the owner and the customers will be assured of the highest standard in quality and grading.

Prices no higher than for standard Southern brands. Write for quotations.

Rogers, Brown & Co.

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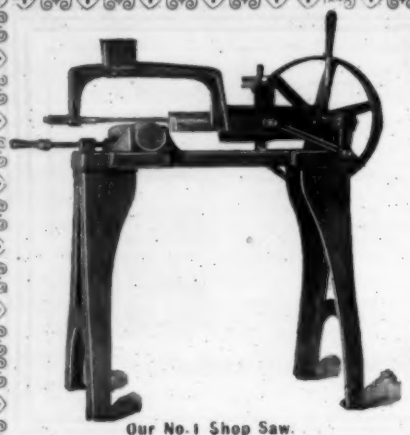

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MADE IN FOUR STYLES.

If you need a cheap saw of small capacity write us.

THE Q AND C

Chicago.

New York.

The Woodward Iron Co. and the Republic Iron & Steel Co., each have two in blast. The work of repairing the Trussville furnace is being pushed.

The large pipe works at Bessemer, Ala., belonging to the United States Cast Iron Pipe & Foundry Co., is at work on a big order from Mexico, and shipments are being made for the system of water works to be put in in the City of Mexico.

The strike among the molders at the H. Wetter Mfg. Co., Memphis, Tenn., has been settled, and the 80 molders who walked out of the shop about two weeks ago have returned to work.

The furnace of the Jefferson (Tex.) Iron Works will soon be put in blast.

The Springfield (Ill.) Iron Co. has given out the statement that the company is still in debt to the amount of $92,456.19. The plant of the company was recently sold to the Republic Iron & Steel Co. on a $4,000 basis.

The work of the Gem furnace at Shenandoah, Va., is being hurried to completion. Many improvements and repairs are being made. To reach a new ore bank a branch railroad five miles long is to be built from the furnace across into the Massanutten Mountains.

Bridgeford & Co., of Danville, N. Y., whose foundry recently burned, have purchased the plant of Scanlan & Co., for $43,000 and will take charge at once.

John Miller, an iron manufacturer of Baltimore, has leased the Globe foundry at Port Chester, N. Y., formerly owned by S. S. Bent, and will put it in operation. Nearly 200 men will be employed when it is in full working order. The foundry was closed four years ago.

The great mill of the Baltimore & Ohio Railroad at Cumberland, Md., has been leased by the Potomac Steel Co. and put in operation.

The annual inspection of the works of the Maryland Steel Co., at Sparrow's Point, was made last week by the officials of the Pennsylvania Steel Co. Three of the four furnaces are in blast and the fourth will go into blast as soon as supplies are on the ground. In all about 3,000 men are at work in he various departments.

The Pittsburg Steel Foundry, of Pittsburg, has just announced the following appointments of representatives in the several districts: F. D. Moffatt & Co., 81 Fulton st., New York City; J. B. Newkirk & Co., Harrison Building, Philadelphia, Pa; F. J. Ruth, 1500 Fisher Building, Chicago, Ill., and George C. Beals, Erie County Savings Bank, Buffalo, N. Y.

The Lorain Steel Co., Lorain, O., has purchased another blowing engine for its Bessemer department.

The Lloyd Booth Co., of Youngstown, O., has contracted for raising the roof of its foundry, and for other changes, preparatory to installing a 30 ton Pawling & Harnischfeger electric crane.

The New Era Iron Works, of Dayton, O., manufacturers of gas and gasoline engines, have recently purchased a new plant, which they are now remodeling and equipping with all the latest machinery. By Jan. 1 their capacity will be doubled.

Edward E. Erikson, the well known Pittsburg engineer, has been awarded a contract to build a heating furnace for the Garden City Wire & Spring Co., Chicago. The plant of the company was recently destroyed by fire, and preparations are being made to build a new works, the main building of which will be 200x75 feet. This work will be done by the Milwaukee Bridge & Iron Co., of Milwaukee.

W. J. Brant, Pittsburg representative of the Playford Stoker Co., of Cleveland, has secured an additional order from the Apollo Iron & Steel Co., Vandergrift, for 12 250 h. p. stokers, making 42 stokers of this type installed in these works. A second order for 1,000 h. p. stokers was received from the Edward Ford Plate Glass Co., Toledo, O.

The Granite City Steel Works, Granite City, Ill., which is improving its plant to the extent of $1,000,000, will employ 2,000 persons when the improvements are completed.

The Gobeille Pattern Co., of Cleveland, is now getting out

MATTHEW ADDY & CO.,

Cincinnati, O.

St. Louis. Philadelphia. New York. Chicago. Pittsburg.

PIG IRON.

If you need any soft iron for quick shipment we can supply it. If you was to contract for next year we can make you fair prices for the best brands in the market.

MOUNT SAVAGE FIRE BRICK.

UNION MINING CO,

Proprietors of the CELEBRATED Mount Savage Fire Brick

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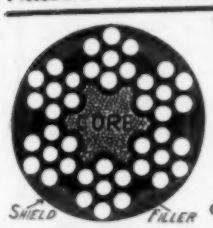

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BUHL MALLEABLE CO., Detroit, Mich.

several thousand dollars worth of patterns for a German firm. In shipping, some of the more delicate work has to be packed in tin boxes hermetically sealed to prevent deleterious action of sea air. In a recent shipment of patterns for a firm in Scotland, not one was found in bad order, this because of the care with which the patterns were packed. The Gobeille Pattern Co. took the order from German competitors both on time of delivery and price.

The Tidewater Steel Co., of Chester, Pa., has just received from Pittsburg a new 125-ton hydraulic shear. It weighs, without its bed, 125 tons. The blast furnace of the company is now in successful operation. It was thoroughly repaired and modernized for the purpose of making basic iron for use in the adjoining basic open-hearth plant. This is partly in operation at present making bottom-cast plate ingots. The open-hearth plant consists of two 20-ton furnaces which have been repaired and two 50-ton basic furnaces which are under erection and are approaching completion. The product will be used in the 12-inch plate mill now in course of erection and which is equipped throughout with transfer and cooling tables, heating furnaces and hydraulic charging crane of modern type. It is hoped to have the mill in operation in about 60 days. These improvements are under the direction of Henry Aiken, M. E., of Pittsburg, who is consulting engineer of the company.

The *Railroad Gazette* reports new railroad equipment as follows: Grand Trunk will build 10 locomotives. Rock Island will probably order 16 freight locomotives, and Great Northern of Canada 12. Burlington, Cedar Rapids & Northern is having 20 engines built. Pittsburg, Bessemer & Lake Erie has ordered 5; Duluth & Iron Range, 10; Pittsburg & Lake Erie 10; Belt Railway, of Chicago, 4; Wisconsin Central, 10. Michigan Central is about to order 100 cars. Jacksonville & Southwestern has ordered 10. Wheeling & Lake Erie will order 10 passenger cars. Reading has ordered 1,000 freight cars. Rock Island is preparing to build 600. Central of New Jersey has placed an order for 1,000 box and 500 gondola cars. New York Central has ordered 250 flat cars; Rock

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CATALOGUE SENT ON REQUEST.

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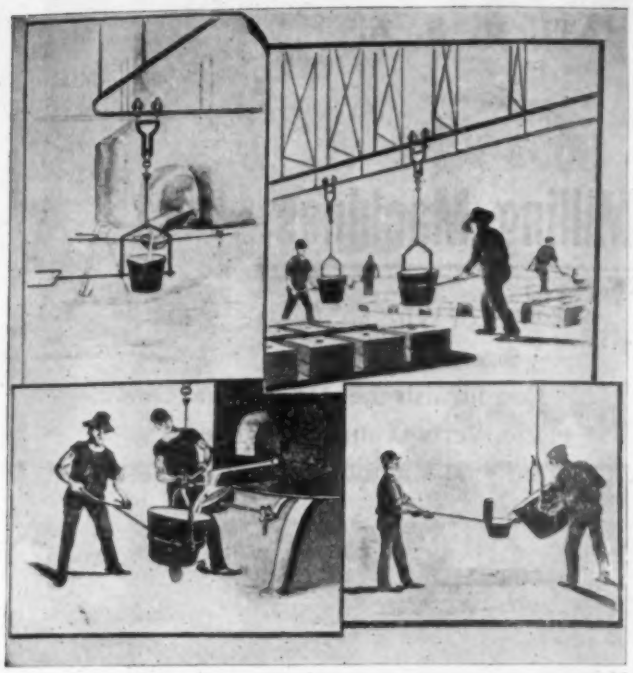
Island & Peoria, 50 box cars; Wisconsin Central, 500 box cars; Lake Shore, 500 gondola cars. The contract for building about 1,500 box and refrigerator cars for Minneapolis, St. Paul and Sault Ste. Mari e was let last week. Great Northern of Canada will order 31 passenger cars, sleepers, etc., 300 cattle cars, 100 flat cars, 4 cabooses, and 4 refrigerator cars.

A LARGE sale of coking coal lands in southern Fayette county has been made at Uniontown, Pa., which will place $750,000 in the hands of the owners. The deal includes 3,000 acres in the vicinity of McClellandtown, the purchasers being the American Steel & Wire Co., under the name of the American Coke Co. The company will build two plants of 500 ovens each, one on the Keener farm and the other on the Moser farm. It already owns the 400 ovens at Baggaley erected by the Puritan Coke Co. John McFayden has been made general manager and is on the ground. The extensions of the Baltimore & Ohio and the Southwest roads to the Masontown fields pass through this tract. This deal makes a total of nearly $4,000,000 that has passed into the hands of landowners in Fayette county this year for their coal, and makes nearly 11,000 acres of coal in that neighborhood to pass into the hands of syndicates.

Excursions to Cincinnati via Pennsylvania Lines.

October 24th and 25th low rate non-transferable excursion tickets will be sold to Cincinnati from Pennsylvania Lines ticket stations in Ohio, for the State Baptist Convention, good to return until Friday, October 27th.

Foundries



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Location.	Stacks.	Daily Capacity. Tons.	Style Machine.
National Tube Works Company, McKeesport, Pa.	2	600	Double.
Carnegie Steel Company, Ltd., Duquesne, Pa.	4	2,.00	Double.
Carnegie Steel Company, Ltd., Edgar Thompson	9	3,500	Six
Carnegie Steel Company, Ltd., Rankin (Carrie)	2	700	Double.
Carnegie Steel Company, Ltd., Pittsburg (Lucy)	2	800	Double.
Struthers Furnace Company, Struthers, O.	1	302	Sing e.
Laughlin & Co., Ltd., Pittsburg, Pa. (Eliza)	5	2,000	Double (2).
Oliver & Snyder Steel Company, Pittsburg, Pa. (Ed th)	1	400	Double.
Oliver & Snyder Steel Company, New Castle, Pa. (Rosena)	1	500	Double.
Shenango Valley Steel Company, New Cast e, Pa.	2	800	Double.
Bellaire Steel Company Bellaire, O.	2	700	Double.
Lebanon Furnaces, Lebanon, O.	2	500	Double.
Tennessee Coal Iron & Railroad Company, Ensley, Ala.	4	800	Double.
R verside Iron Works, Wheeling, W. Va	2	700	Double.
American Steel & Wire Co.	7	3,600	Double (3)
Totals	46	17,700	.....

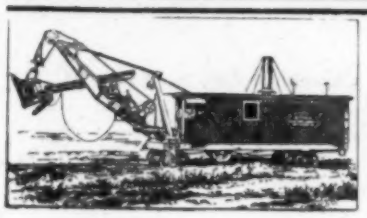
For particulars write
G. H. GINTHER, Special Agent, Carnegie Bldg., Pittsburg, Pa.

BY THE

Uehling Method

is covered by U. S. patents Nos. 548,146, 629,480 and 632,031, which are fundamental, and others are pending.

The use of the Uehling Method at the furnaces mentioned has shown reduced labor cost, while **SANDLESS IRON** has proved a great advantage to the consumer.



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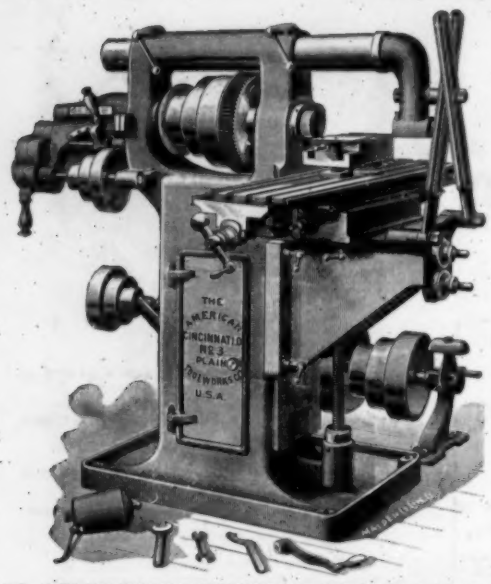

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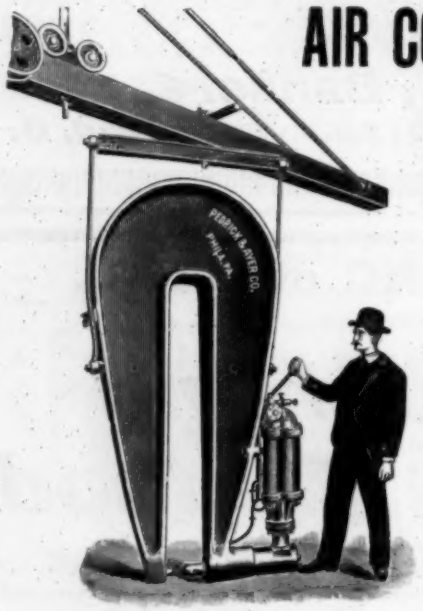

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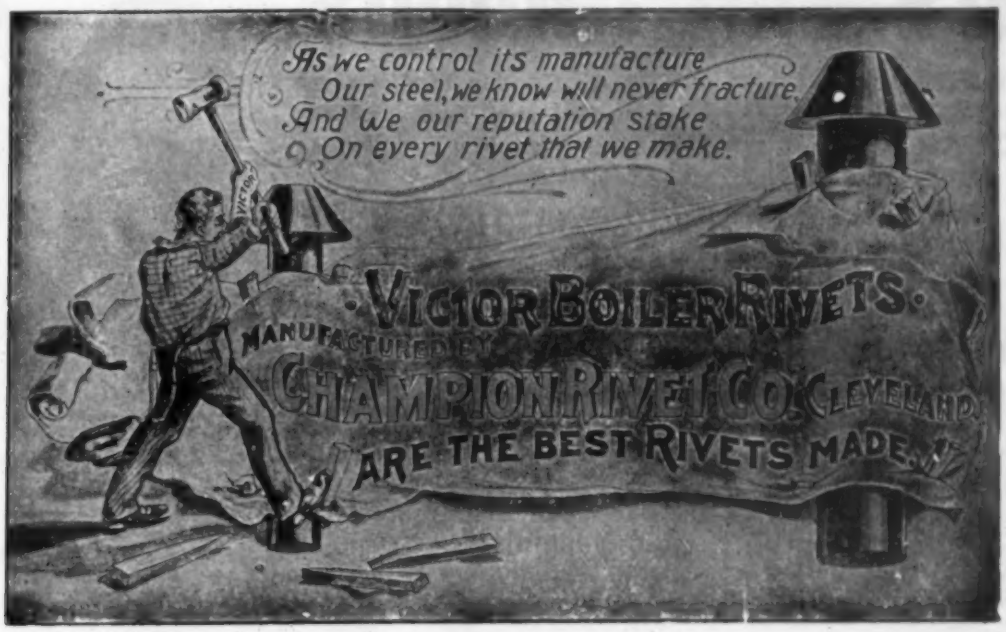
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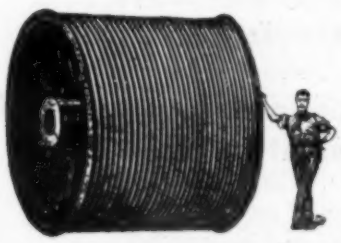

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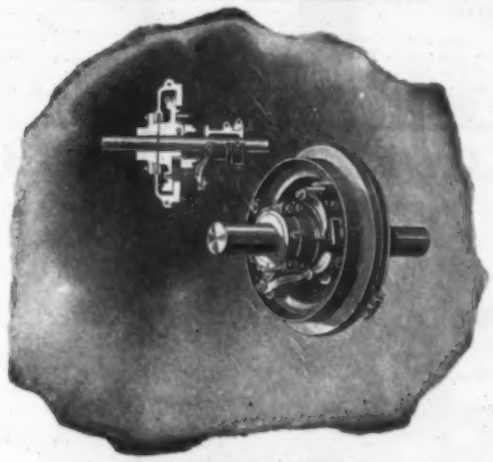

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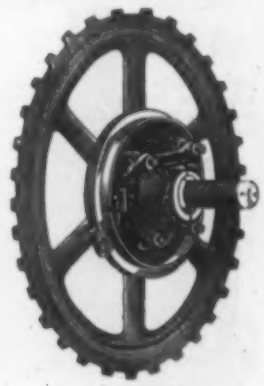

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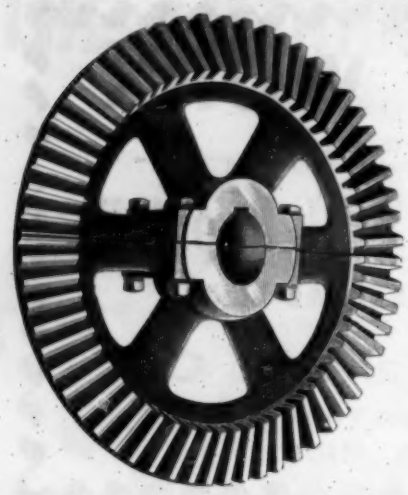

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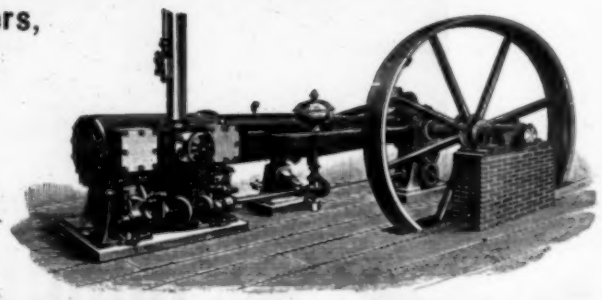

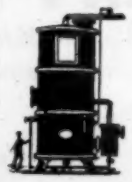

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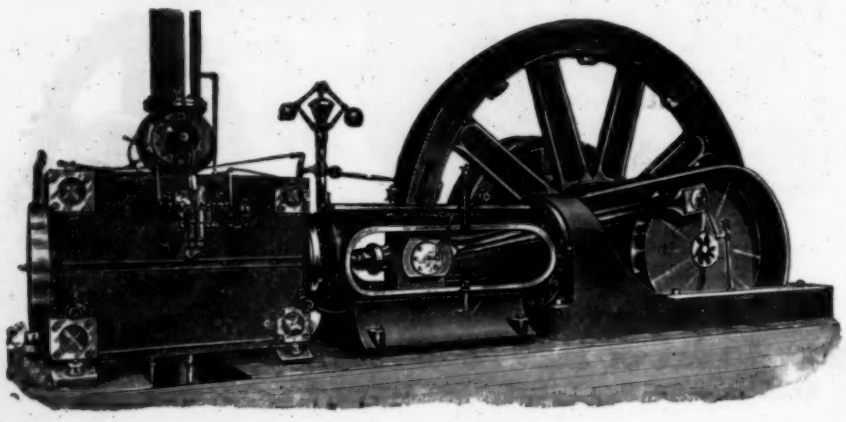

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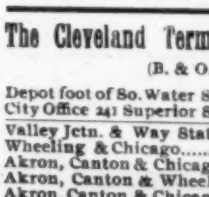

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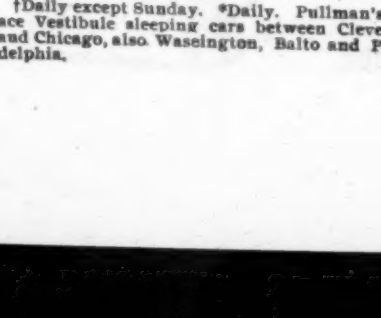

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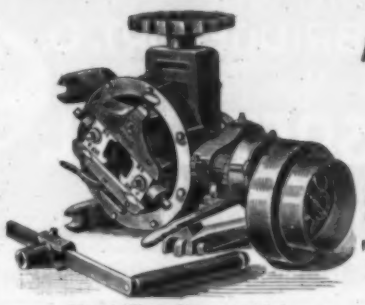

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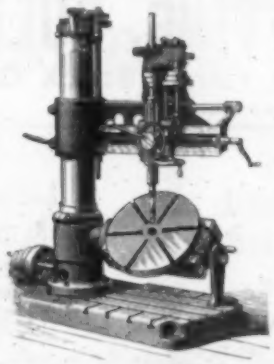

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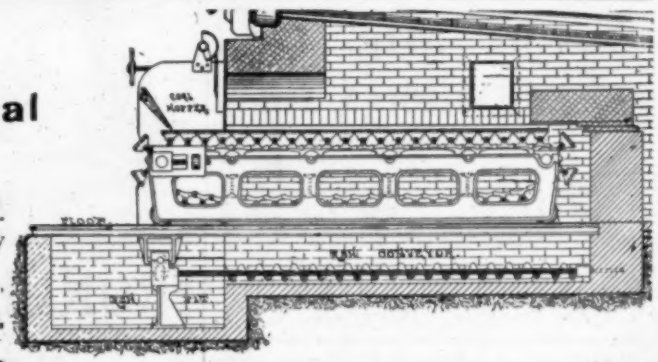

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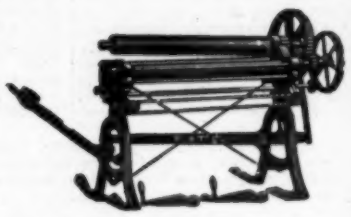

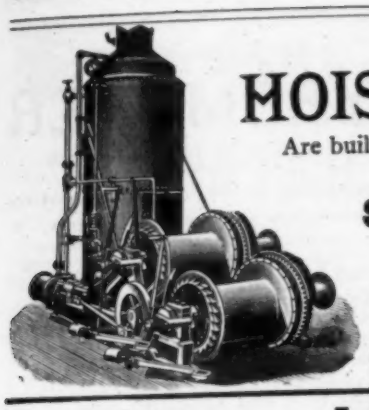

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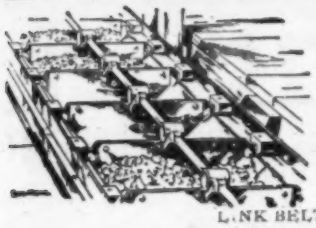

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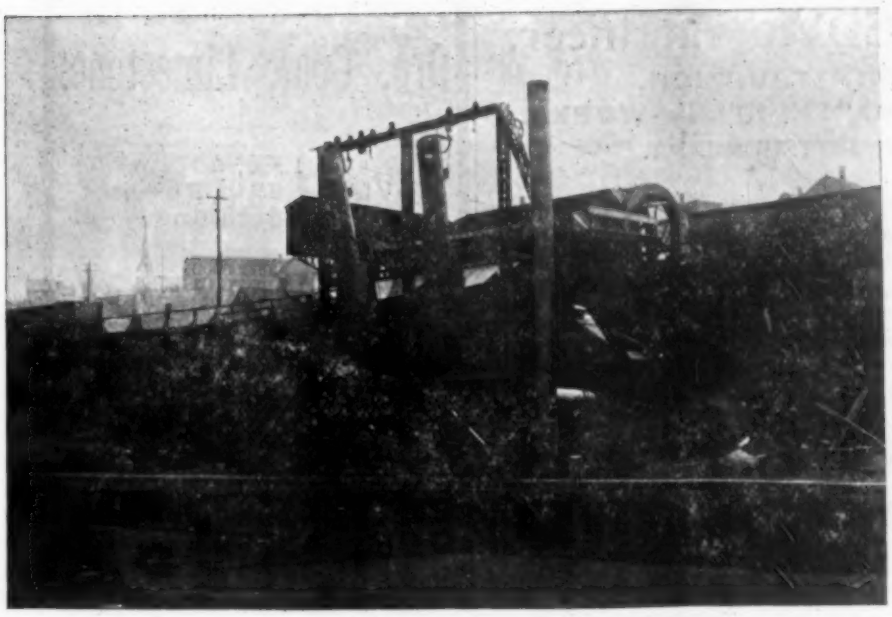

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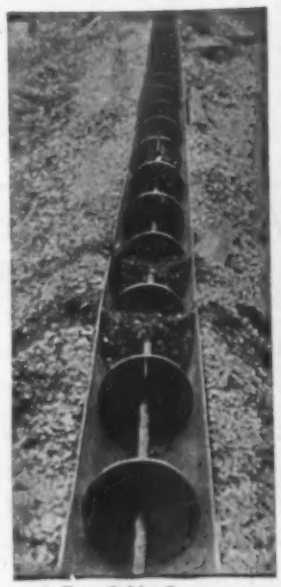

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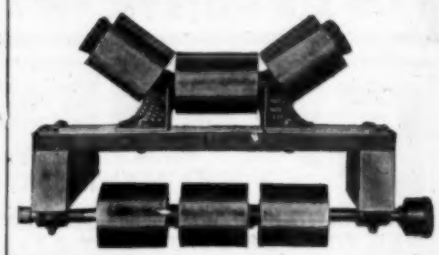

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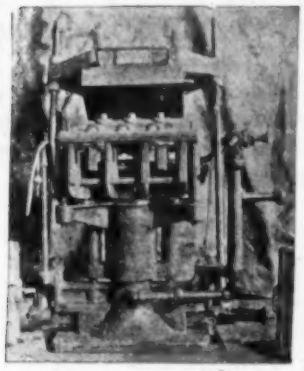

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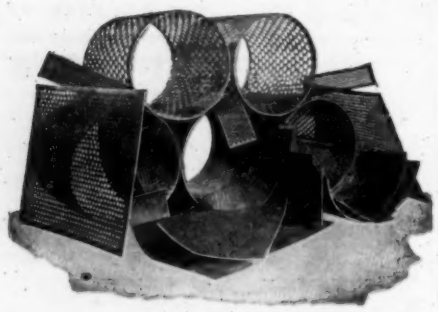

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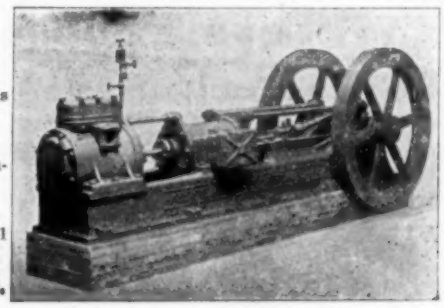

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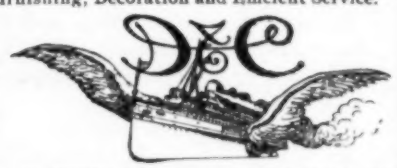

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DIRECTORY

To the Iron and Steel Works of the United States for 1898.

PUBLISHED BY
THE AMERICAN IRON AND STEEL ASSOCIATION

Thoroughly Revised. Price, Seven Dollars.

The American Iron and Steel Association has just completed a thorough revision of its Directory to the Iron and Steel Works of the United States, bringing down to April, 1898, a description of these works. It also contains a complete Directory to many leading industries which are large consumers of iron and steel. This edition, which is the fourteenth that has been issued, embraces more complete details of all the iron and steel works of the United States, and of industries which are large consumers of iron and steel, than any preceding edition. It retains all the old features of preceding editions and contains many new features.

In the edition for 1896 there was given for the first time a complete list of Malleable Iron Works in the United States, and to this new feature there are now added complete lists of the Rail Mills, Structural Mills, Steel Casting Works, Bolt, Nut and Rivet Works, Chain Works, Seamless Tube Works, and Riveted Pipe Works—all new features.

The lists of Plate and Sheet Mills and of Tin Plate and Stamping Works are much more complete than in previous editions. The names and location of all the works described are given in alphabetical order, followed by a description of their character, capacity and products, with the names of the principal officers, etc., including the names of selling agents. This edition makes a cloth-bound book of nearly 400 well-printed pages—many more than in any previous edition. It contains a complete list of all the

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Bessemer Steel Works,
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Rail Mills,
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Cut-Nail Works,
Tin Plate Works,
Stamping Works,
Forges and Bloomaries,
Wire Rod and Wire Mills,
Wire Nail Works,
Iron and Steel Bridge Builders,
Iron and Steel Ship Builders,
Horse-Nail Works,
Locomotive Works,
Malleable Iron Works,
Cast Iron Pipe Works,
Cast Iron Soil and Plumbers' Pipe Works,
Wrought Iron, Wrought Steel and Riveted Pipe Works,
Seamless Tube Works,
Chain Works,
Bolt, Nut and Rivet Works,
Car Axle Works,
Car Wheel Works, and
Car Builders in the United States

ALSO A LIST OF THE

Iron and Steel Works in Canada and Mexico.

This edition of the Directory is an invaluable book of reference for all business men who wish to correspond with iron and steel manufacturers or with iron and steel consumers, forming, in every respect, a COMPLETE GUIDE to the iron and steel works of this country and to the principal works which consume iron and steel.

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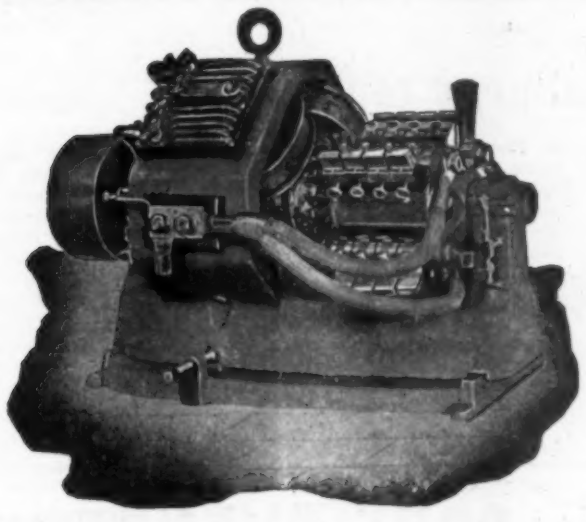

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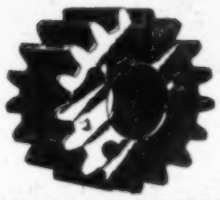

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No. 1 Specular, Bessemer	$4.25@	5.00
No. 1 Bessemer, hematite	4.00@	4.75
Hematites No. 1 non-Bessemer	3.50@	3.75
No. 1 Specular, non-Bessemer	3.50@	4.80
Mesabi Bessemer	3.50@	4.00

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Cleveland (f. o. b. cars):

Bessemer		$24.00
No. 1 Strong Foundry	$23.00@	23.50
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Gray Forge, red short	21.35@	21.75
No. 1 American Scotch	23.00@	23.50
No. 2 American Scotch	22.25@	22.75
Lake Superior Charcoal	25.00@	29.00

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Old iron rails	$30.00
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Old car wheels	19.00
	Net Tons.
No. 1 R. R. wrought scrap	$22.00
Mill scrap	17.00
No. 1 Machine cast scrap	16.00
Iron axles	27.00
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Wrought turnings (free from cast)	13.00
Cast borings	11.00
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Steel boiler plates	16.00
Grate bars	11.00
Pipes and flues (clean)	15.00
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Hoop and band iron	13.00
Sheet iron	10.00
Wrought drillings	13.00
Malleable iron	15.00

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Beams and channels (f. o. b. Cleveland)		2.35c
Angles	2.35@	2.45c
Tees		2.45c
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Sheared plates		3.00c

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[Less than car-lots, Cleveland.]

Rounds and Squares—Bar Iron.

1 to 1⅞	2.50 Base.
2 to 2⅝	.20 extra.
3 to 3½	.50 "
3⅝ to 4	.80 "
4⅛ to 4⅜	1.00 "
4⅝ to 5	1.30 "
5⅛ to 6	1.80 "
6⅛ to 6⅜	2.20 "
6⅝ to 7⅜	2.50 "
¾ to ⅞	.10 "
⅝ to 11-16	.30 "
½ to 9-16	.30 "
7-16 to 15-32	.40 "
⅜ to 13-72	.50 "
5-16 to 1-32	.70 "
¼ to 9-32	.90 "
7-32	1.40 "
3-16	2.50 "

Flats.—Bar Iron.

1½ to 4 x ⅜ to 1	1.05 Base
4⅛ to 6 x ⅜ to 1	.10 extra
6⅛ to 8 x ⅜ to 1	.60 "
8⅛ to 10 x ⅜ to 1	.80 "
1⅜ to 4 x 1 1-16 to 1¾	.30 "
4⅛ to 6 x 1 1-16 to 1¾	.40 "
6⅛ to 8 x 1 1-16 to 1¾	.60 "
8⅛ to 10 x 1 1-16 to 1¾	.90 "
2 to 4 x 1⅜ to 2	.50 "
4⅛ to 6 x 1⅜ to 2	.60 "
6⅛ to 8 x 1⅜ to 2	.80 "
8⅛ to 10 x 1⅜ to 2	1.00 "
2 to 4 x 2⅛ to 3	.60 "
4⅛ to 6 x 2⅛ to 3	.80 "
6⅛ to 8 x 2⅛ to 3	1.00 "
1⅛ to 1⅜ x ⅜ to 1	.10 "
1 to 1 1-16 x ⅜ to ⅝	.30 "
⅝ to 15-16 x ⅜ to ⅝	.40 "
⅝ to 11-16 x ⅜ to ⅝	.50 "
½ to 9-16 x ⅜ to ⅝	.90 "

Heavy Band Iron.

7 to 10 x ¼ to 5-16	.70 extra.
6⅛ to 6⅝ x ¼ to 5-16	.50 "
4⅛ to 6 x ¼ to 5-16	.30 "
1⅜ to 4 x ¼ to 5-16	.20 "
1 to 1⅜ x ¼ to 5-16	.30
⅝ to 15-16 x ¼ to 5-16	.50 "
⅝ to 11-16 x ¼ to 5-16	.80 "
½ to 9-16 x ¼ to 5-16	1.00 "
⅜ to 7-16 x ¼ to 5-16	1.50 "

Heavy bands, 7-32 in. thick 1-10 c. per lb. higher than ¼ to 5-16 thick. **Bevel Edge Shaft Iron** 1-10 higher than same size of Heavy Bands.

Light Band Iron.

7 to 8 x No. 9 to 3-16	.90 extra
7 to 8 x Nos. 10, 11 and 12	1.00 "
6⅛ to 6⅝ x No. 9 to 3-16	.70 "
6⅛ to 6⅝ x Nos. 10, 11 and 12	.80 "
4⅛ to 6 x No. 9 to 3-16	.50 "
4⅛ to 6 x Nos. 10, 11 and 12	.60 "
1⅜ to 4 x No. 9 to 3-16	.40 "
1⅜ to 4 x Nos. 10, 11 and 12	.50 "
1 to 1 3-16 x No. 9 to 3-16	.50 "
1 to 1 3-16 x Nos. 10, 11 and 12	.60 "
13-16 to ⅞ x No. 9 to 3-16	.60 "
13-16 to ⅞ x Nos. 10, 11 and 12	.70 "
11-16 to ¾ x No. 9 to 3-16	.80 "
11-16 to ¾ x Nos. 10, 11 and 12	.90 "
9-16 to ⅝ x No. 9 to 3-16	1.00 "
9-16 to ⅝ x Nos. 10, 11 and 12	1.10 "

7-16 to ½ x No. 9 to 3-16.....1.30 extra
7-16 to ½ x Nos. 10, 11 and 12.....1.40
⅝ x No. 9 to 3-16.....1.50
⅝ x Nos. 10, 11 and 12.....1.60

Bevel Edge Box Iron.

Same as Light Bands, of same sizes.

Beaded Band Iron, 1¼ in. to 2 in.....
Sand Band Iron, 1-16 c. above same sizes of Light Bands.

Oval Iron.

⅜ to 1¼.....40 extra
⅜ to 13-16.....50 "
⅜ to 11-16.....60 "
⅜ to 9-16.....80 "
⅜ to 7-16.....1.10 "
½ to 9-16 x 3-16.....1.00 "
½ to 11-16 x ⅛.....1.20 "

Half Oval and Half Round.

2½ to 3.....60 extra
2 to 2.....50 "
1 to 13-16.....70 "
¾ to 11-16.....90 "
½ to 9-16.....1.20 "
⅜ to 7-16.....2.50 "
5-16.....3.50 "
¼.....4.50 "

Half Ovals less than ¼ their width in thickness extra price.

Horse Shoe Iron.

All sizes.....1 c. extra.
Cutting ordinary bars to specified length, .20 to .30 extra, according to length and size.

Steel Bands.

Width in Inches.	English Standard Gauge.		
1 1-2 to 6,	Nos. 7, 8, 9 or 3-16"	1.50 Base. Extras.	
1¼ to 6,	" 10, 11, 12 or ¼"	.05 per 100 lbs.	
1 to 1¼,	" 7, 8, 9 or 3-16"	.10	"
1 to 1¼,	" 10, 11, 12 or ¼"	.15	"
13-16 and ⅞,	" 7, 8, 9 or 3-16"	.20	"
13-16 and ⅞,	" 10, 11, 12 or ¼"	.25	"
11-16 and ¾,	" 7, 8, 9 or 3-16"	.30	"
11-16 and ¾,	" 10, 11, 12 or ¼"	.35	"
9-16 and ⅝,	" 7, 8, 9 or 3-16"	.40	"
9-16 and ⅝,	" 10, 11, 12 or ¼"	.45	"
½,	Nos. 7, 8, 9 or 3-16"	.55	"
½,	" 10, 11, 12 or ¼"	.60	"
7-16	" 7, 8, 9 or 3-16"	.75	"
7-16	" 10, 11, 12 or ¼"	.85	"
⅜,	" 7, 8, 9 or 3-16"	.95	"
⅜,	" 10, 11, 12 or ¼"	1.05	

Iron and Steel Hoops.

Width Inches.	English Standard Gauge.		
7-16 to 3	Nos. 13, 14, 15 and 16	1.60 Base Extras.	
7-16 to 2,	" 17, 18, and 19	.05 per 100 lbs	
7-16 to 2,	" 20	.10	"
7-16 to 2,	" 21	.15	"
7-16 to 1¼,	" 22	.25	"
½ to 1¼,	" 13, 14 and 15	.05	"
½ to 1¼,	" 16, 17 and 18	.10	"
1¼ to 1¾,	" 19 and 20	per 100 lbs.	
1¼ to 1¾,	" 21	.20	"
1¼ to 1¾,	" 22	.30	"
15-16 and 1,	" 13, 14 and 15		"
15-16 and 1,	" 16, 17 and 18	.15	"
15-16 and 1,	" 19 and 20	.20	"
15-16 and 1,	" 21	.25	"
15-16 and 1,	" 22	.35	"
¾,	Nos. 13, 14 and 15	.20	"
¾,	" 16, 17 and 18	.25	"
¾,	" 19 and 20	.30	"
¾,	" 21	.35	"
¾,	" 22	.45	"
¾ and 13-16	Nos. 13, 14 and 15	.30	"
¾ and 13-16	" 16, 17 and 18	.35	"
¾ and 13-16	" 19 and 20	.40	"
¾ and 13-16	" 21	.45	"
¾ and 13-16	" 22	.50	"
¾ and 13-16	" 23	.60	"
11-16,	Nos. 13, 14 and 15	.35	"
11-16,	" 16, 17 and 18	.40	"
11-16,	" 19 and 20	.50	"
11-16,	" 21	.60	"
11-16,	" 22	.70	"
11-16,	" 23	.80	"
⅝,	Nos. 13, 14 and 15	.40	"
⅝,	" 16, 17 and 18	.45	"
⅝,	" 19 and 20	.55	"
⅝,	" 21	.65	"
⅝,	" 22	.75	"
⅝,	" 23	.85	"
9-16,	" 13, 14 and 15	.45	"
9-16,	" 16, 17 and 18	.50	"
9-16,	" 19 and 20	.60	"
9-16,	" 21	.70	"
9-16,	" 22	.80	"
9-16,	" 23	.90	"
½,	" 13, 14 and 15	.55	"
½,	" 16, 17 and 18	.60	"
½,	" 19 and 20	.70	"
½,	" 21	.80	"
½,	" 22	.90	"
½,	" 23	1.00	"
7-16,	" 13, 14 and 15	.80	"
7-16,	" 16, 17 and 18	.90	"
7-16,	" 19 and 20	1.00	"
⅜,	" 13, 14 and 15	1.00	"
⅜,	" 16, 17 and 18	1.10	"
⅜,	" 19 and 20	1.20	"

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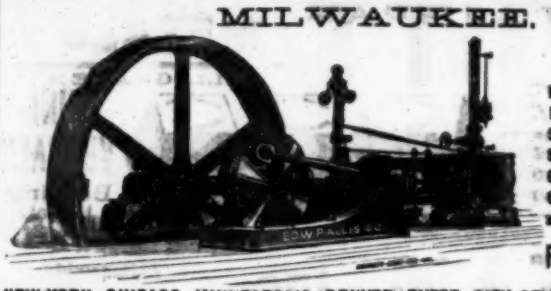

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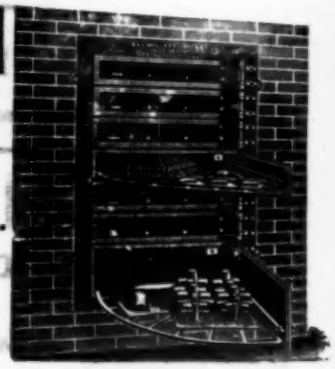
James M. Swank, author of "Iron in All Ages," and editor of the *Bulletin* of The American Iron & Steel Association, in reviewing "Metallurgy of Cast Iron," says it is "One of the most valuable publicationr relating to the manufacture of iron castings, that has ever, to ous knowledge, been issued in this or any other country."

MILLETT'S PATENT CORE OVEN



No one who makes small cores can afford to be without it.
DOUBLE DOORS,
One closing the oven when the other is open.
Saves Fuel, Saves Time.
SEND FOR CIRCULAR.
MILLETT CORE OVEN CO., Brightwood, Mass.
The Core Ovens may be seen in the sample rooms of The S. Obermayer Co., either in Cincinnati or Chicago. W. Parsons & Co., Philadelphia, Pa.

Not every insertion of every advertiser's card brings an order for the advertiser's good; no more does every visit of the traveling salesman result in a sale.

There is a vast deal in familiarity with the type and phrase in which a manufacturer makes himself known to the advertisement reader, just as the personal acquaintance of his traveling salesman gets him a hearing when a strange face and a strange voice are bowed out with a "busy day's" courtesies.

The best advertisers, the most successful advertisers, the advertisers who get returns, are those who keep everlastingly at it.

This is a case in which familiarity breeds business.

BRASS FOUNDERS FINISHERS J. J. RYAN & CO.
8874 West Monroe St., Chicago.
Best Bronze, Babbitt Metals, Brass and Aluminum CASTINGS On Short Notice.

BUYERS' DIRECTORY.

BORING AND TURNING MILLS—
H. Bickford, Lakeport, N. H.
U. Baird Machinery Co., Pittsburg, Pa.

AGRICULTURAL SHAPES—
Republic Iron & Steel Co., Chicago, Ill.

AIR COMPRESSORS—
Edw. P. Allis Co., Milwaukee, Wis.
Rand Drill Co., Chicago, Ill.
Clayton Air Compressor Works, New York.
Ingersoll-Sergeant Drill Co., New York.
Hall Steam Pump Co., Pittsburg, Pa.
Manning, Maxwell & Moore, New York City.

AIR HOISTS—
Northern Engineering Works, Detroit, Mich.

AIR LIFT PUMPS—
Clayton Air Compressor Works, New York.
The Ingersoll-Sergeant Drill Co., New York.

ANALYTICAL CHEMISTS—
F. A. Emmerton, Cleveland, O.
O. Textor, Cleveland, O
The Robert W. Hunt & Co., Chicago, Ill.
John T. Jones & Co., Chicago, Ill.
Cremer & Bicknell, Cleveland, O.

ANGLES—
Republic Iron & Steel Co., Chicago, Ill.
American Steel Hoop Co., Pittsburg, Pa.

ANNEALING BOXES—
Meehan Boiler & Construction Co., Lowellville, Ohio.

ANTI-FRICTION METAL—
C. H. Besly & Co., Chicago, Ill.
Wm. Cramp & Sons, Philadelphia, Pa.
Swarts Metal Refining Co., Chicago, Ill.
Perfect Lubricating Metal Co., Cincinnati, O.
Merchant & Co., Inc., Philadelphia, Pa.
F. R. Phillips Sons' Co., Philadelphia, Pa.
J. J. Ryan & Co., Chicago, Ill.

BABBITT METAL—
C. H. Besly & Co., Chicago, Ill.
Swarts Metal Refining Co., Chicago, Ill.
Perfect Lubricating Metal Co., Cincinnati, O.
Merchant & Co., Inc., Philadelphia, Pa.
Lorain Foundry Co., Lorain, O.
J. J. Ryan & Co., Chicago, Ill.

BALLS—
Cleveland Ball & Screw Co., Cleveland, O.

BAR IRON AND STEEL—
Monongahela Iron & Steel Co., Pittsburg, Pa.
Ætna-Standard Iron & Steel Co., Bridgeport, O.
Bourne-Fuller Co., Cleveland, O.
Republic Iron & Steel Co., Chicago, Ills.
American Steel Hoop Co., Pittsburg, Pa.

BEARING METAL—
C. H. Besly & Co., Chicago, Ill.
Swarts Metal Refining Co., Chicago, Ill.
Perfect Lubricating Metal Co., Cincinnati, O.
Merchant & Co., Inc., Philadelphia, Pa.
F. R. Phillips Sons' Co., Philadelphia, Pa.
J. J. Ryan & Co., Chicago, Ill.

BELTING—
C. H. Besly & Co., Chicago, Ill.
The Chicago Rawhide Mfg. Co., Chicago, Ill.
The Gandy Belting Co., Baltimore Md.
Main Belting Co., Philadelphia, Pa.

BELT CONVEYORS—
Robins Conveying Belt Co., New York City.

BELT LACING—
The Bristol Co., Waterbury, Conn.

BLACKSMITH AND CARRIAGE SUPPLIES—
C. H. Besly & Co., Chicago, Ill.

BLAST FURNACE MACHINERY—
Excelsior Iron Works Co., Cleveland, O.

BLAST FURNACE WORK—
Enterprise Boiler Co., Youngstown, O.
Meehan Boiler & Construction Co., Lowellville, Ohio.
The Wm. B. Pollock Co., Youngstown, O.
Riter-Conley Mfg. Co., Pittsburg, Pa.
Southwark Foundry & Machine Co., Philadelphia, Pa.

BLOWING ENGINES—
Southwark Foundry & Machine Co., Philadelphia, Pa.
Edward P. Allis Co., Milwaukee, Wis.

BOILERS AND BOILER ATTACHMENTS—
The Wm. B. Pollock Co., Youngstown, O.
Cahall Sales Department, Pittsburg, Pa.
Enterprise Boiler Co., Youngstown, O.
The Edward P. Allis Co., Milwaukee, Wis.
Hooven, Owens & Rentschler Co., Hamilton, O.
Harrison Safety Boiler Works, Philadelphia.
Meehan Boiler & Construction Co., Lowellville, O
Wm. Cramp & Sons, Philadelphia, Pa.
Riter-Conley Mfg. Co., Pittsburg, Pa.
The Aultman Co., Canton, O.
Fraser & Chalmers, Chicago, Ill.
Excelsior Iron Works Co., Cleveland, O.
James Bonar & Co., Pittsburgh, Pa.
W. P. Davis Machine Co., Rochester, N. Y.

BOILER CLEANERS—
Union Boiler Tube Cleaner Co., Pittsburg, Pa.

BOILER COVERING—
C. H. Besly & Co., Chicago, Ill.

BOILER COMPOUNDS—
The Ironsides Company, Columbus, O.

BOILER FRONTS AND FITTINGS—
Playford Stoker Co., Cleveland, O.

BOILER TUBES—
S. Fix Sons, Cleveland, O.
National Tube Co., Pittsburg, Pa.
Shelby Steel Tube Co., Cleveland, O.,

BOILER TUBE CLEANERS—
Union Boiler Tube Cleaner Co., Pittsburg, Pa

BOLTS AND NUTS—
Upson Nut Co. Cleveland, O.

I. & E Greenwald Co., Cincinnati, O.
Webster Camp & Lane Machine Co., Akron, O.
Totten & Hogg Iron and Steel Foundry Co., Pittsburg, Pa.
Baush & Harris Machine Tool Co., Springfield, Mass.
Bickford Drill and Tool Co., Cincinnati, O.

BRASS CASTINGS—
J. J. Ryan & Co., Chicago, Ill.
Lorain Foundry Co., Lorain, O.

BRIDGES—
Shiffler Bridge Co., Pittsburg.

BUILDINGS (STEEL FRAME)—
Shiffler Bridge Co., Pittsburg.
Riter-Conley Mfg. Co., Pittsburg, Pa.

BUCKETS AND DERRICKS—
Excelsior Iron Works Co., Cleveland, O.

CARS—
The Pressed Steel Car Co., Pittsburg, Pa.

CAR UNLOADERS—
Excelsior Iron Works Co., Cleveland, O.

CARRYING TONGS—
Vulcan Mfg. Co., Pittsburg, Pa.

CASTINGS—
Seaman-Sleeth Co., Pittsburg, Pa.
Hooven, Owens & Rentschler Co., Hamilton, O
Macbeth & Co., Cleveland, O.
W. A. Jones Foundry Co., Chicago, Ill.
Brass Founders' Supply Co., Newark, N. J.
The Aultman Co., Canton, O.
Riverside Foundry Co., Cleveland, O.
Wheeling Mold & Foundry Co., Wheeling, W. Va.
Lorain Foundry Co., Lorain, O.
Bethlehem Steel Co., South Bethlehem, Pa.

CASTINGS (ALUMINUM)
J. J. Ryan & Co., Chicago, Ill.

CASTINGS (BRASS)—
J. J. Ryan & Co., Chicago, Ill.
Lorain Foundry Co Lorain. O.

CASTINGS (BRONZE)—
J. J. Ryan & Co., Chicago, Ill.
Lorain Foundry Co., Lorain, O.

CASTINGS (MALLEABLE)—
Acme Malleable Iron Works, Buffalo, N. Y.
Buhl Malleable Co., Detroit, Mich.

CEMENT—
The Brier Hill Iron & Coal Co., Youngstown, O
Garden City Sand Co., Chicago, Ill.
Reed F. Blair & Co., Pittsburg, Pa.

CHAIN HOISTS—
Reading Crane & Hoist Works, Reading, Pa.

CHAIN BELTING—
Heyl & Patterson, Pittsburg, Pa.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Machinery Co., Chicago, Ill.
The Aultman Co., Canton, O.
Buhl Malleable Co., Detroit, Mich.

CHANNELERS—
The Ingersoll-Sergeant Drill Co., New York.

CHEMISTS—
F. A. Emmerton, Cleveland, O.
O. Textor, Cleveland, O.
The R. W. Hunt & Co., Chicago, Ill.
John T. Jones & Co., Chicago, Ill.
Cremer & Bicknell, Cleveland, O.
We Fu Go Co., Cincinnati, O.

CHILLED AND SAND ROLLS—
Wm. Tod & Co., Youngstown, O.
Seaman, Sleeth Co., Pittsburg, Pa.
Riverside Foundry Co., Cleveland, O.
Totten & Hogg Iron and Steel Foundry Co., Pittsburg, Pa.
F. R. Phillips Sons' Co., Philadelphia, Pa.
Lorain Foundry Co., Lorain, O.

CHUCKS—
Skinner Chuck Co., New Britain, Conn.

COAL CUTTERS—
The Ingersoll-Sergeant Drill Co., New York.
Jeffrey Mfg. Co., Columbus, O.

COAL SCREENS—
Rob't. Aitchinson Per. Metal Co., Chicago, Ill.
Jeffrey Mfg. Co., Columbus, O.
The Aultman Co., Canton, O.

COAL AND COKE—
Matthew Addy & Co., Cincinnati, O.
Rogers, Brown & Co., Cincinnati, O
Reed F. Blair & Co., Pittsburg, Pa.
Forster, Waterbury & Co., Chicago, Ill.
H. C. Frick Coke Co., Pittsburg, Pa.
McKeefrey & Co., Leetonia, O.
Washington Coal and Coke Co., Pittsburg, Pa.
Pickands, Mather & Co., Cleveland, O.

COAL HANDLING MACHINERY—
Robins Conveying Belt Co., New York City.

COAL MINING MACHINERY—
Jeffrey Mfg. Co., Columbus, O.
Webster Camp & Lane Machine Co., Akron, O.

CONVEYORS—
Jeffrey Mfg. Co., Columbus, O.
Heyl & Patterson, Pittsburg, Pa.
Link-Belt Machinery Co., Chicago, Ill.
The Aultman Co., Canton, O.
The Brown Hoisting and Conveying Machine Co., Cleveland, O.
Webster Camp & Lane Machine Co., Akron, O.
Robins Conveying Belt Co., New York City.

COMPAROMETERS—
Vulcan Mfg. Co., Pittsburg, Pa.

COMPRESSED AIR SHOP TOOLS—
Clayton Air Compressor Works, New York City.
Rand Drill Co., Chicago, Ill.
The Ingersoll-Sergeant Drill Co., New York.
Q & C Co., Chicago, Ill.
American Pneumatic Tool Co., New York City,
Manning, Maxwell & Moore, New York City.

COMPRESSION COUPLINGS—
The Aultman Co., Canton, O.
Geo. B. Sennett Co., Youngstown, Ohio.

CONTRACTORS FOR CLEANING BOILERS—
Union Boiler Tube Cleaner Co., Pittsburg, Pa.

CORE OVENS—
Millett Core Oven Co., Brightwood, Mass.

CORRUGATED IRON—
Berger Mfg. Co., Canton, O.
Ætna-Standard Iron & Steel Co., Bridgeport, O.
Cincinnati Corrugating Co., Piqua, O.

COTTON TIES—
American Steel Hoop Co., Pittsburg, Pa.

CRANES AND DERRICKS—
Northern Engineering Works, Detroit, Mich.
Wm. Tod & Co., Youngstown, O.
Marion Steam Shovel Co., Marion, O.
Reading Crane & Hoist Works, Reading, Pa.
The Bucyrus Co., South Milwaukee, Wis.
Brown Hoisting and Conveying Machine Co. Cleveland, Ohio.
Excelsior Iron Works Co., Cleveland, O.
Manning, Maxwell & Moore, New York City.
Cleveland Crane & Car Co., Cleveland, O.

CUPOLAS—
Riter-Conley Mfg. Co., Pittsburg, Pa.
Northern Engineering Works, Detroit, Mich.

DIES—
Danielson Machine & Tool Co., Cleveland, O.

DREDGES—
Marion Steam Shovel Co., Marion, O.
The Bucyrus Co., South Milwaukee, Wis.

DRILL GRINDERS—
J. Wendell Cole Columbus, O.

DRILL PRESSES—
American Tool Works Co., Cincinnati, O.
W. P. Davis Machine Co., Rochester, N. Y.
C. H. Besly & Co., Chicago, Ill.
U. Baird Machinery Co., Pittsburg, Pa.
Bickford Drill & Tool Co., Cincinnati, O.
Baush & Harris Machine Tool Co., Springfield Mass.
Manning, Maxwell & Moore, New York City.
Danielson Machine & Tool Co., Cleveland, O.

DROP FORGINGS—
Wyman & Gordon, Worcester, Mass.
Chicago Drop Forge & Foundry Co., Kensington, Ill.

DROP PRESSES—
Bertsch & Co., Cambridge City, Ind.
C. H. Besly & Co., Chicago, Ill.
E. Konigslow & Bro., Cleveland, O.
Danielson Machine & Tool Co., Cleveland, O.

DROP HAMMERS—
Baush & Harris Machine Tool Co., Springfield, Mass.

DYNAMOS—
Jeffrey Mfg. Co., Columbus, O.

EAVE TROUGHS AND CONDUCTORS—
Berger Mfg. Co., Canton, O.

ELEVATING AND CONVEYING MACHINERY—
Heyl & Patterson, Pittsburg, Pa.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Machinery Co., Chicago, Ill.
Lidgerwood Mfg. Co., New York City.
The Aultman Co., Canton, O.
The Brown Hoisting and Conveying Machine Co., Cleveland, O.
Webster Camp & Lane Machine Co., Akron, O.
Buhl Malleable Co., Detroit, Mich.
Robins Conveying Belt Co., New York City.
Excelsior Iron Works Co., Cleveland, O.

EMERY AND CORUNDUM WHEELS—
Star Corundum Wheel Co., Detroit, Mich.
C. H. Besley & Co , Chicago, Ill.
J. Wendell Cole, Columbus and Chicago.
Northampton Emery Wheel Co., Chicago, Ill.
W. P. Davis Machine Co., Rochester, N. Y.

EMERY WHEEL MACHINERY—
J. Wendell Cole, M.E., Columbus, O., or Chicago
Star Corundum Wheel Co., Detroit, Mich.
C. H. Besly & Co., Chicago, Ill.
Northampton Emery Wheel Co., Chicago, Ill.
W. P. Davis Machine Co., Rochester, N. Y.

ENGINEERS AND CONTRACTORS—
Wellman-Seaver Engineering Co., Cleveland, O.
Walter Kennedy, Pittsburg, Pa.
Heyl & Patterson, Pittsburg, Pa.
Meehan Boiler & Construction Co., Lowellville, O
E. E. Erickson, Pittsburg, Pa.
John T. Jones & Co., Chicago, Ill.
Riter-Conley Mfg. Co., Pittsburg, Pa.
Jeffrey Mfg. Co., Columbus, O.
Alex Laughlin & Co., Pittsburg, Pa.
We Fu Go Co., Cincinnati, O.
James Bonar & Co., Pittsburg, Pa.

ENGINE PACKING—
Jenkins Bros., New York City.
C. H. Besly & Co., Chicago, Ill.

ENGINEERS' SUPPLIES—
C. H. Besly & Co., Chicago, Ill.
Jenkins Bros., New York City.

ENGINE LATHES—
U. Baird Machinery Co., Pittsburg, Pa.
American Tool Works Co., Cincinnati, O.

ENGINES (OIL)—
The Aultman Co., Canton, O.

ENGINES (STEAM)—
W. P. Davis Machine Co., Rochester, N. Y
Wm. Tod & Co., Youngstown, O.
The Edward P. Allis Co., Milwaukee, Wis.
The Hooven, Owens & Rentschler Co., Hamilton, O.
The Aultman Co., Canton, O.
Geo. B. Sennett Co., Youngstown, Ohio.

GEARING—
I. & E. Greenwald Co., Cincinnati, O.
The R. D. Nuttall Co., Allegheny, Pa.
The Van Dorn & Dutton Co., Cleveland, O.

Fraser & Chalmers, Chicago, Ill.
Southwark Foundry & Machine Co., Philadelphia, Pa.
James Bonar & Co., Pittsburg, Pa.

ENGRAVERS AND ELECTROTYPERS—
Central Electrotype & Engraving Co., Cleveland, O.
National Engraving Co., Cleveland, O.,
Samuel R. Mason, Cleveland, O.

FEED WATER HEATERS AND PURIFIERS—
Harrison Safety Boiler Works, Philadelphia, Pa.
James Bonar & Co., Pittsburg, Pa.
We Fu Go Co., Cincinnati, O.
Austin Separator Co., Detroit, Mich.

FILES, MAKERS OF—
C. H. Besly & Co., Chicago, Ill,

FIRE BRICK AND CLAY—
J. V. Rose, Sharon, Pa.
Union Mining Co., Mt. Savage, Md.
Clearfield Fire Brick Co., Clearfield, Pa.
Dover Fire Brick Co., Cleveland, O.
F. B. Stevens, Detroit, Mich.
Chicago Fire Clay Product Co., Chicago, Ill.
Scioto Star Fire Brick Works, Portsmouth, O.
Kentucky Fire Brick Works, Portsmouth O.
Webster Fire Brick Co., South Webster, O.
Ætna Fire Brick Co., Oak Hill, O.
Oak Hill Fire Brick & Coal Co., Oak Hill, O.
Holmes, Strachan & Co., Detroit. Mich.
Garden City Sand Co., Chicago, Ill.
A. F. Smith & Co., New Brighton. Pa.
Chas Taylor's Sons Co. Cincinnati, O.

FIRE PROOF COVERING—
C. H. Besly & Co., Chicago, Ill.

FLEXIBLE SHAFTS—
Union Boiler Tube Cleaner Co., Pittsburg, Pa.

FLUE CLEANERS—
Union Boiler Tube Cleaner Co., Pittsburg, Pa.

FOOT AND POWER LATHES—
U. Baird Machinery Co., Pittsburg, Pa.

FORGINGS—
Chicago Drop Forge & Foundry Co., Kensington, Ill.
Cleveland City Forge & Iron Co., Cleveland, O.
Bethlehem Steel Co., South Bethlehem, Pa.
Bræburn Steel Co., Braeburn, Pa.
Wyman & Gordon, Worchester, Mass.
Danielson Machine & Tool Co., Cleveland, O.

FOUNDRIES—
Wm. Tod & Co., Youngstown, O.
Seaman, Sleeth Co., Pittsburg, Pa.
Hooven, Owens & Rentschler Co., Hamilton, O.
W. A. Jones Foundry Co., Chicago.
Jeffrey Mfg. Co., Columbus, O.
Brass Founders' Supply Co., Newark, N. J.
The Aultman Co., Canton, O.
Riverside Foundry Co., Cleveland, O.
I. & E. Greenwald Co., Cincinnati, O.
Wheeling Mold & Foundry Co., Wheeling, W.Va.
Excelsior Iron Works Co., Cleveland, O.
Macbeth & Co., Cleveland, O.

FOUNDRY EQUIPMENT.
Miller & Hays, Akron, O.
Tabor Mfg. Co., Elizabeth, N. J.
Millett Core Oven Co., Brightwood, Mass.
Brass Founders Supply Co., Newark, N. J.
Vulcan Mfg. Co., Pittsburg, Pa.
Northern Engineering Works, Detroit, Mich.
Cleveland Crane & Car Co., Cleveland, O.

FOUNDRY FACINGS—
Cleveland Facing Mill Co., Cleveland, O.

FOUNDRY SUPPLIES—
Northern Engineering Works, Detroit, Mich.
Chas. Taylor's Sons Co., Cincinnati, O.
Miller & Hays, Akron, O.
Clearfield Fire Brick Co., Clearfield, Pa.
Cleveland Crane & Car Co., Cleveland, O.
The Ohio Sand Co., Conneaut, O.
Union Mining Co., Mt. Savage, Md.
Dover Fire-Brick Co., Cleveland. O
A. F. Smith & Co., New Brighton, Pa.
Tabor Mfg. Co., Elizabeth, N. J.
F. B. Stevens, Detroit, Mich.
Millett Core Oven Co., Brightwood, Mass.
Cleveland Facing Mill Co., Cleveland. O.
Garden City Sand Co., Chicago, Ill.
Chicago Fire Clay Product Co., Chicago, Ill.
Brass Founders' Supply Co., Newark, N. J.
Vulcan Mfg. Co., Pittsburg, Pa.
Scioto Star Fire Brick Works, Portsmouth, O.
Kentucky Fire Brick Works, Portsmouth, O.
Webster Fire Brick Co., South Webster, O.
Ætna Fire Brick Co., Oak Hill, O.
J. V. Rose, Sharon, Pa.
Oak Hill Fire Brick & Coal Co., Oak Hill, O.
Holmes, Strachan & Co., Chicago, Ill.
Newport Sand Bank Co., Newport, Ky.

FRICTION METAL—
C. H. Besly & Co., Chicago, Ill.
Swarts Metal Refining Co., Chicago, Ill.
Perfect Lubricating Metal Co., Cincinnati, O.
Merchant & Co., Inc., Philadelphia, Pa.
F. R. Phillips' Sons Co., Philadelphia, Pa.
J. J. Ryan & Co., Chicago. Ill.

FURNACES—
Playford Stoker Co., Cleveland, O.

FURNACE LININGS—
Union Mining Co., Mt. Savage, Md.

FUEL OIL BURNERS—
W. S. Rockwell & Co., New York City.

GALVANIZED IRON—
Apollo Iron & Steel Co., Pittsburg, Pa.

GALVANIZERS—
Ætna-Standard Iron & Steel Co., Bridgeport, O
Apollo Iron & Steel Co., Pittsburg, Pa.

GALVANIZING POTS—
The Wm. B. Pollock Co., Youngstown, O.

GAS ENGINES—
Northern Engineering Works, Detroit, Mich.

GAUGE COCKS—
James Bonar & Co., Pittsburg, Pa.

GEAR CUTTING—
The R. D. Nuttall Co., Allegheny, Pa.
The Van Dorn & Dutton Co., Cleveland, O.

GEAR LUBRICANTS—
The Ironsides Company, Columbus, O.

GREASE—
A. F. Boettcher, Rowlands, Pa.

GRINDSTONES—
C. H. Besly & Co., Chicago, Ill.

GRAPHITE PAINT—
Jos Dixon Crucible Co., Jersey City, N. J.

GRATE BARS—
Geo. B. Sennett Co., Youngstown, Ohio.

GRAY IRON CASTINGS—
W. A. Jones Foundry Co., Chicago, Ill.
Brass Founders' Supply Co., Newark, N. J.

HACK SAWS—
Millers Falls Co., New York City.
Q & C Co., Chicago, Ill.

HANGERS—
E. A. Delano, Chicago, Ill.
Dodge Mfg. Co., Mishawaka, Ind.
The Aultman Co., Canton, O.
Jones & Laughlins, Ltd., Pittsburg, Pa.
I. & E. Greenwald Co., Cincinnati, O.

HARNESS SNAPS—
Covert Mfg. Co., West Troy, N. Y.

HOISTS—
Reading Crane & Hoist Works, Reading, Pa.
The Aultman Co., Canton, O.
Lidgerwood Mfg. Co., New York City.

HEATERS AND PURIFIERS—
Harrison Safety Boiler Works, Philadelphia.
James Bonar & Co., Pittsburg, Pa.
We Fu Go Co., Cincinnati, O.
Austin Separator Co., Detroit, Mich.

HEAVY HARDWARE—
C. H. Besly & Co., Chicago, Ill.
Parkhurst & Wilkinson Co., Chicago, Ill.

HOISTING ENGINES—
The Edward P. Allis Co., Milwaukee, Wis.
Lidgerwood Mfg. Co., New York City.
The Aultman Co., Canton, O.
Webster, Camp & Lane Machine Co., Akron, O.
Excelsior Iron Works Co., Cleveland, O

HOISTING MACHINERY—
Link-Belt Machinery Co., Chicago, Ill.
Reading Crane & Hoist Works, Reading, Pa.
Jeffrey Mfg. Co. Columbus, O.
Excelsior Iron Works Co., Cleveland, O.
Lidgerwood Mfg. Co., New York City.
Heyl & Patterson, Pittsburg, Pa.
The Aultman Co., Canton, O.
The Brown Hoisting and Conveying Machine Co., Cleveland, O.
Webster, Camp & Lane Machine Co., Akron, O.
Robins Conveying Belt Co., New York City.

HORSE SHOES—
Phoenix Horse Shoe Co., Joliet, Ill.

HOTELS—
United States Hotel Co., Cleveland, O.

IMPULSE CLEANERS—
Union Boiler Tube Cleaner Co., Pittsburg, Pa.

INDUSTRIAL CARS—
The Pressed Steel Car Co., Pittsburg, Pa.

INGOT MOLDS—
Lorain Foundry Co., Lorain, O.

INJECTORS—
C. H. Besly & Co., Chicago, Ill.
Manning, Maxwell & Moore, New York City.
James Bonar & Co., Pittsburg, Pa.

INSURANCE COMPANIES—
Hartford Steam Boiler I. & I. Co., Hartford, Ct.

IRON BUILDINGS—
Shiffler Bridge Co., Pittsburg, Pa.
Riter-Conley Co., Pittsburg, Pa.

IRON NAILS AND STEEL—
Bethlehem Steel Co., South Bethlehem, Pa.
C. H. Besly & Co., Chicago, Ill.
R. H. Stroud & Co., Chicago, Ill.
Parkhurst & Wilkinson Co., Chicago, Ill.

IRON AND STEEL ROOFING—
Berger Mfg. Co., Canton, O.
Ætna-Standard Iron & Steel Co., Bridgeport, O.

IRON ORE—
Lake Superior Consolidated Iron Mines New York City, N. Y.
Oglebay, Norton & Co., Cleveland, O.
M. A. Hanna & Co., Cleveland. O.
Drake Bartow & Co., Cleveland, O.
Pickands, Mather & Co., Cleveland, O.

IRON WORKING TOOLS—
American Tool Works Co., Cincinnati, O.
H. Bickford, Lakeport, N. H
C. H. Besly & Co., Chicago. Ill.
U. Baird Machinery Co., Pittsburg. Pa.
Armstrong Bros. Tool Co., Chicago, Ill.
The Armstrong Mfg. Co., Bridgeport, Conn.
Bickford Drill & Tool Co., Cincinnati, O.
Skinner Chuck Co., New Britain, Conn.
Baush & Harris Machine Tool Co., Springfield, Mass.
Danielson Machine & Tool Co., Cleveland, O.
Manning, Maxwell & Moore, New York City.
Cleveland Ball & Screw Co., Cleveland, O.
W. P. Davis Machine Co., Rochester, N. Y.

LINK BELTING—
The Jeffrey Mfg. Co., Columbus, O.
Link-Belt Machinery Co., Chicago, Ill.
Heyl & Patterson, Pittsburg, Pa.
The Aultman Co., Canton, O.

LADLES—
Northern Engineering Works, Detroit, Mich.

LATHES—
W. P. Davis Machine Co., Rochester, N. Y.
U. Baird Machinery Co., Pittsburg. Pa.
Bickford Drill & Tool Co., Cincinnati, O.
Danielson Machine & Tool Co., Cleveland, O.
Manning, Maxwell & Moore, New York City.
American Tool Works Co., Cincinnati, O.

LUBRICATORS—
A. F. Boettcher, Rowlands, Pa.

MACHINISTS' TOOLS AND SUPPLIES—
American Tool Works Co., Cincinnati, O.
W. P. Davis Machine Co., Rochester, N. Y.
H. Bickford, Lakeport, N. H.
C. H. Besly & Co., Chicago, Ill.
U. Baird Machinery Co., Pittsburg, Pa.
Bertsch & Co., Cambridge City, Ind.
Armstrong Bros. Tool Co., Chicago, Ill.
Bickford Drill & Tool Co., Cincinnati, O.
Parkhurst & Wilkinson Co., Chicago, Ill.
Skinner Chuck Co., New Britain, Conn.
Baush & Harris Machine Tool Co., Springfield Mass.
Danielson Machine & Tool Co., Cleveland, O.
Manning, Maxwell & Moore, New York City.

MACHINE SCREWS—
C. H. Besly & Co., Chicago, Ill.

MACHINE SHOPS—
The R. D. Nuttall Co., Allegheny, Pa.
H. A. Streeter, Chicago, Ill.
Danielson Machine & Tool Co., Cleveland, O.

MACHINERY AND TOOL STEEL—
C. H. Besley & Co., Chicago, Ill.
Bræburn Steel Co., Bræburn, Pa.
Crescent Steel Co., Pittsburg, Pa.
La Belle Steel Co., Pittsburg, Pa
Byron H. White, Chicago, Ill.
Morris & Bailey Steel Co., Pittsburg, Pa.

MAGNESIA COVERING—
C. H. Besly & Co., Chicago, Ill.

MALLEABLE CASTINGS—
Acme Malleable Iron Works, Buffalo, N. Y.
Buhl Malleable Co., Detroit, Mich.

MANUFACTURING CHEMISTS—
We Fu Go Co., Cincinnati, O.

MANUFACTURED IRON AND STEEL—
Bourne-Fuller & Co., Cleveland, O.
Ætna-Standard Iron & Steel Co., Bridgeport, O.
The Morris & Bailey Steel Co., Pittsburg, Pa.
Parkhurst & Wilkinson Co., Chicago, Ill.
Ohio Steel Co., Youngstown. O.
Republic Iron & Steel Co., Chicago, Ill.
Monongahela Iron & Steel Co., Pittsburg, Pa.

METAL BEARINGS—
C. H. Besly & Co., Chicago, Ill.
Perfect Lubricating Metal Co., Cincinnati, O.
Merchant & Co., Inc., Philadelphia, Pa.
Swarts Metal Refining Co., Chicago, Ills.
F. R. Phillips' Sons Co., Philadelphia, Pa.
J. J. Ryan & Co., Chicago, Ill.

METAL CEILINGS—
Berger Manufacturing Co., Canton, O.

MILLING MACHINES—
American Tool Works Co., Cincinnati, O.
W. P. Davis Machine Co., Rochester, N. Y.
U. Baird Machinery Co., Pittsburg, Pa.
Danielson Machine & Tool Co., Cleveland, O.
Manning, Maxwell & Moore, New York City.

MINING MACHINERY—
C. H. Besly & Co., Chicago, Ill.
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Jeffrey Mfg. Co., Columbus, O.
Lidgerwood Mfg. Co., New York City.
Wm. Cramp & Sons, Philadelphia, Pa
The Bucyrus Co., South Milwaukee, Wis.
Marion Steam Shovel Co., Marion, O.
Webster, Camp & Lane Machine Co., Akron, O.
Fraser & Chalmers, Chicago, Ill.
Robins Conveying Belt Co., New York City.
Excelsior Iron Works Co., Cleveland, O.

MINE PUMPS—
F. M. Prescott Steam Pump Co., Milwaukee, Wis.

MOLDING MACHINES—
Tabor Mfg. Co., Elizabeth, N. J.

MOLDING SAND—
Ohio Sand Co., Conneaut, O.
F. B. Stevens, Detroit, Mich.
Garden City Sand Co., Chicago, Ill.
Newport Sand Bank Co., Newport, Ky.

MULTIPLE DRILLS—
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Baush & Harris Machine Tool Co., Springfield, Mass.

NICKEL PLATING OUTFITS—
Northampton Emery Wheel Co., Chicago, Ill.

NUTS AND BOLTS—
Upson Nut Co., Cleveland, O.

OILLESS BEARINGS—
C. H. Besly & Co., Chicago, Ill.

OIL BURNERS—
W. S. Rockwell & Co., New York City.

OIL CUPS—
C. H. Besly & Co., Chicago, Ill.
James Bonar & Co., Pittsburg, Pa.

OIL FILTERS—
James Bonar & Co., Pittsburg, Pa.

OIL PUMPS—
C. H. Besly & Co., Chicago, Ill.

OIL SEPARATORS—
Harrison Safety Boiler Works, Philadelphia, Pa.
Austin Separator Co., Detroit, Mich.

ORE CARS—
The Pressed Steel Co. Pittsburg, Pa.

ORE CRUSHERS—
The Edward P. Allis Co., Milwaukee, Wis.
Jeffrey Mfg. Co., Columbus, O.
The Aultman Co., Canton, O.
Fraser & Chalmers Chicago, Ill.

ORE SCREENS—
Seibel-Suesdorf Copper & Iron Mfg. Co., St. Louis, Mo.
Rob't Aitchison Per. Metal Co., Chicago, Ill.
The Aultman Co., Canton, O.
Fraser & Chalmers, Chicago, Ill.
James Bonar & Co., Pittsburg, Pa.

PACKING—
C. H. Besly & Co., Chicago, Ill.
Jenkins Bros., New York City.

PAINT—
Iron Clad Paint Co., Cleveland, O.
Jos. Dixon Crucible Co., Jersey City, N. J.
C. Wilford Peters, Cincinnat O.

PATTERN WORKS—
Gobeille Pattern Co., Cleveland, O.

PERFORATED METALS—
Seibel-Suessdorf Copper & Iron Mfg. Co., St. Louis, Mo.
Aitchison Perforated Metal Co., Chicago, Ill.
Fraser & Chalmers, Chicago, Ill.

PIG IRON—
Matthew Addy & Co., Cincinnati, O.
Rogers, Brown & Co., Cincinnati, O.
Reed F. Blair & Co., Pittsburg, Pa.
Clinton Iron & Steel Co., Pittsburg.
Forster, Waterbury & Co., Chicago, Ill.
Bourne-Fuller Co. Cleveland, O.
M. A. Hanna & Co., Cleveland, O.
E. H. Stroud & Co., Chicago, Ill.
F. B. Stevens, Detroit, Mich.
McKeefrey & Co., Leetonia, O.
Superior Charcoal Iron Co., Grand Rapids, Mich
Spearman Iron Co., Sharpsville, Pa.
Hickman, Williams & Co., Chicago, Ill,
The Brier Hill Coal & Iron Co., Youngstown, O.
Pickands, Mather & Co., Cleveland, O.
Republic Iron & Steel Co., Chicago, Ill.
American Steel Hoop Co., Pittsburg, Pa.
American Steel & Wire Co., Chicago, Ill,

PIG IRON CASTING APPARATUS—
Heyl & Patterson, Pittsburg, Pa
G. H. Ginther, Special Agent, Pittsburg, Pa.

PIPE CLEANERS—
Union Boiler Tube Cleaner Co., Pittsburg, Pa.

PIPE COVERING—
C. H. Besly & Co., Chicago, Ill.
Jenkins Bros., New York

PIPE CUTTING AND THREADING MACHINES—
The Armstrong Mfg. Co., Bridgeport, Conn.

PLANERS—
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U. Baird Machinery Co., Pittsburg, Pa.
Bickford Drill & Tool Co., Cincinnati, O.
Danielson Machine & Tool Co., Cleveland, O
Manning, Maxwell & Moore, New York City.
American Tool Works Co., Cincinnati, O.

PLATES—
Enterprise Boiler Co., Youngstown, O.
Republic Iron & Steel Co., Chcago, Ill.

PLUMBERS' AND GAS FITTERS' SUPPLIES—
C. H. Besly & Co., Chicago, Ill.

PNEUMATIC APPLIANCES—
Clayton Air Compressor Works, New York.

PNEUMATIC TOOLS—
American Pneumatic Tool Co., New York City
Q & C Co., Chicago, Ill.

PORTABLE FORGE—
C. H. Besly & Co., Chicago, Ill.
Vulcan Mfg. Co., Pittsburg, Pa.

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Baush & Harris Machine Tool Co., Springfield Mass.

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Bertsch & Co., Cambridge City, Ind.
E. Konigslow & Bro. Cleveland, O.
Danielson Machine & Tool Co., Cleveland, O.

POWER TRANSMISSON MACHINERY—
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E. A. Delano, Chicago, Ill.
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The Aultman Co., Canton, O.
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Jones & Laughlins, Ltd., Pittsburg, Pa
I. & E. Greenwald Co., Cincinnati, O.

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Blakeslee Mfg. Co., Du Quoin, Ill.
Fred M. Prescott Steam Pump Co., Milwaukee Wis.
Hall Steam Pump Co., Pittsburg, Pa.
Southwark Foundry & Machine Co., Philadelphia, Pa.

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Vulcan Mfg. Co., Pittsburg, Pa.

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Baush & Harris Machine Tool Co., Springfield, Mass.

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Garden City Sand Co., Chicago, Ill.

RIVETS—
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Jonse & Laughlins, Ltd., Pittsburg, Pa.

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The Ingersoll-Sergeant Drill Co., New York.

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F. R. Phillips' Sons Co., Philadelphia, Pa

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Riter-Conley Mfg. Co., Pittsburg, Pa.

SAWS—
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Harrington & King Perforating Co., Chicago.
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Fraser & Chalmers, Chicago, Ill.

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Upson Nut Co., Cleveland, O.
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Jeffrey Mfg. Co., Columbus, O.
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Baush & Harris Machine Tool Co., Springfield, Mass.
American Tool Works Co., Cincinnati, O.

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Ætna-Standard Iron & Steel Co., Bridgeport, O.
E. H. Stroud & Co., Chicago, Ill.
Republic Iron & Steel Co., Chicago, Ill.

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The Aultman Co., Canton, O.
Jeffrey Mfg. Co., Columbus, O.
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Wheeling Mold & Foundry Co., Wheeling, W. Va.
Danielson Machine & Tool Co., Cleveland, O.

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STEAM PIPE AND BOILER COVERING—
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STEAM PACKING—
C. H. Besly & Co., Chicago, Ill.

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Hall Steam Pump Co., Pittsburg, Pa.
Blakeslee Mfg. Co., Du Quoin, Ill.
Fred. M. Prescott Steam Pump Co., Milwaukee, Wis.
Edw. P. Allis Co., Milwaukee, Wis.
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Marion Steam Shovel Co., Marion, O
The Bucyrus Co., South Milwaukee, Wis.

STEAM SPECIALTIES—
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James Bonar & Co., Pittsburg, Pa.

STEEL—
Otis Steel Co., Cleveland, O.
E. H. Stroud & Co., Chicago, Ill.
Braeburn Steel Co., Braeburn, Pa.
Crescent Steel Co., Pittsburg, Pa.
La Belle Steel Co., Pittsburg, Pa.
The Morris & Bailey Steel Co., Pittsburg, Pa.
Byron H. White, Chicago, Ill.
Monongahela Iron & Steel Co., Pittsburg, Pa.
American Steel Hoop Co., Pittsburg, Pa.
American Steel & Wire Co., Chicago, Ill.

STEEL BLOOMS AND BILLETS—
American Steel & Wire Co., Chicago, Ill.

STEEL BALLS—
Cleveland Ball & Screw Co., Cleveland, O.

STEEL BANDS—
American Steel Hoop Co., Pittsburg, Pa.
American Steel & Wire Co Chicago, Ill.

STEEL CARS—
The Pressed Steel Car Co., Pittsburg, Pa.

STEEL CASTINGS—
Otis Steel Co., Cleveland, O.
Q & C Co., Chicago, Ill.
Bethlehem Steel Co., South Bethlehem, Pa.

STEEL CEILINGS—
Berger Manufacturing Co., Canton, O.

STEEL HOOPS—
American Steel Hoop Co., Pittsburg, Pa.

STEEL PLANTS—
The Wm. B. Pollock Co., Youngstown, O.
The Riter-Conley Co., Pittsburg, Pa.

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Bethlehem Steel Co., South Bethlehem, Pa.
Ohio Steel Co., Youngstown, Ohio.
The Lorain Steel Co., Lorain, O.
Jones & Laughlins, Ltd., Pittsburg, Pa.
American Steel Hoop Co., Pittsburg, Pa.

STEEL STAMPS AND STENCILS—
J. H. Fleharty & Co., Cleveland, O.

STEEL TUBES—
Shelby Steel Tube Co. Cleveland, O.

STOKERS—
Playford Stoker Co., Cleveland, O.

TANKS—
Enterprise Boiler Co., Youngstown, O.
Meehan Boiler & Construction Co., Lowellville, O
The Wm. B. Pollock Co., Youngstown, O.
Riter-Conley Mfg. Co., Pitsburg, Pa.
The Aultman Co., Canton, O.

TANK CARS—
The Wm. B. Pollock Co., Youngstown, O.

TIN AND TERNE PLATES—
E. H. Stroud & Co., Chicago, Ill.
American Tin Plate Company, Chicago, Ill.

TIN PLATE MACHINERY—
Totten & Hogg Iron and Steel Foundry Co., Pittsburg, Pa.
F. R. Phillips' Sons Co., Philadelphia, Pa.

TOOL STEEL—
C. H. Besly & Co., Chicago, Ill.
Braeburn Steel Co., Braeburn, Pa.
Crescent Steel Co., Pittsburg, Pa.
La Belle Steel Co., Pittsburg, Pa.
Monongahela Iron & Steel Co., Pittsburg, Pa.

TRANSMISSION MACHINERY—
Heyl & Patterson, Pittsburg, Pa.
Link-Belt Machinery Co., Chicago, Ill.
The Lane & Bodley Co., Cincinnati, O.
W. A. Jones Foundry & Machine Co., Chi
Jeffrey Mfg. Co., Columbus, O.
Dodge Mfg. Co., Mishawaka, Ind.
The Aultman Co., Canton, O.
Brown Hoisting and Conveying Machine Co., Cleveland, Ohio.

TROLLEY TRACKS—
Northern Engineering Wotks, Detroit, Mich.
Miller & Hays, Akron, O.

TRUCKS—
Northern Engineering Works, Detroit, Mich.

TUBES—
National Tube Co., Pittsburg, Pa.
Shelby Steel Tube Co., Cleveland, O.
S. Pix' Sons, Cleveland, O.

TUBE CLEANERS—
Union Boiler Tube Cleaner Co., Pittsburg, Pa.

TUBE WELDING—
S. Pix Sons, Cleveland, O.

TUMBLERS—
Northern Engineering Works, Detroit, Mich.

TURNBUCKLES—
Republic Iron & Steel Co., Chicago, Ill.
Cleveland City Forge & Iron Co., Cleveland, O.

TWIST DRILLS—
C. H. Besly & Co., Chicago, Ill.

TWIST DRILL CASES—
Vulcan Mfg. Co., Pittsburg, Pa.

VALVES—
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Jenkins Bros., New York City
Manning, Maxwell & Moore, New York City.
James Bonar & Co., Pittsburg, Pa.

WATER SOFTENING PLANTS—
We Fu Go Co., Cincinnati, O.

WIRE—
American Steel & Wire Co., Chicago, Ill.

WIRE COATING—
The Ironsides Company, Columbus, O.

WIRE FENCING—
American Steel & Wire Co., Chicago, Ill.

WIRE FILLER—
The Ironsides Company, Columbus, O.

WIRE MACHINERY—
S. W. Goodyear, Waterbury, Conn.

WIRE NAILS—
American Steel & Wire Co., Chicago, Ill.

WIRE ROPE COATING—
The Ironsides Company, Columbus, O.

WIRE ROPE FILLING—
The Ironsides Company, Columbus, O.

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Dodge Mfg. Co., Mishawaka, Ind.

WROUGHT PIPE—
National Tube Co., Pittsburg, Pa.

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The star (*) indicates that the adv. appears alternate weeks; the dagger (†) once a month; the double dagger (‡) once in three weeks; the parallel (‖) three times out of four.

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Delays of this kind may be avoided by the use of.....

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CANNOT BE EXCELLED. WRITE FOR PARTICULARS.

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Now is the time for you to spread out.

Extend your business and create a demand for your devices in new fields.

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About the things he has to sell,
Won't reap the golden dollars,
Like one who climbs a tree and—hollers.—Ex.

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Inspected Foundry Irons. Softness, Strength, Fluidity, Uniformity.

American Scotch

Ibrand unequaled.'

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[CLEVELAND, O.

Absolutely without a rival.

Perfect Lubricating Metal.

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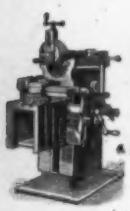

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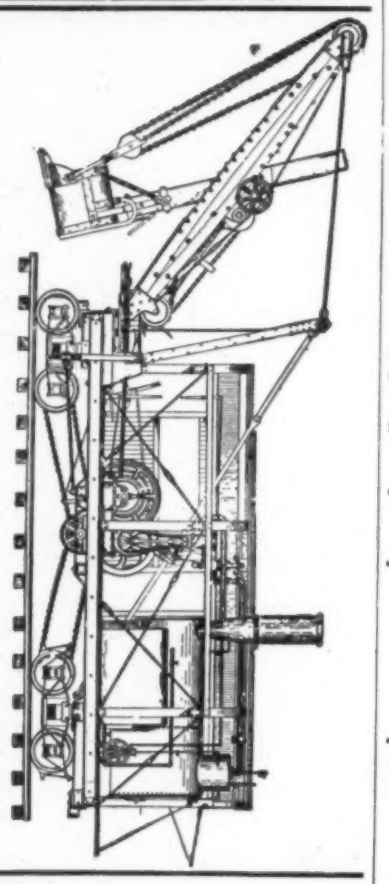

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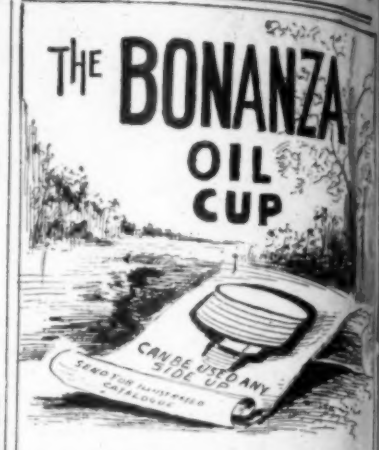

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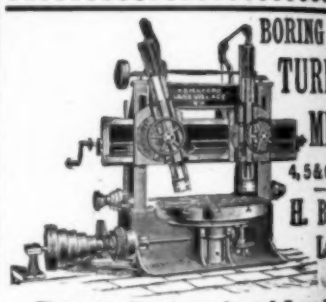

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